Dependency of Geodynamic Parameters on the GNSS Constellation

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Overview

Introduction and Motivation

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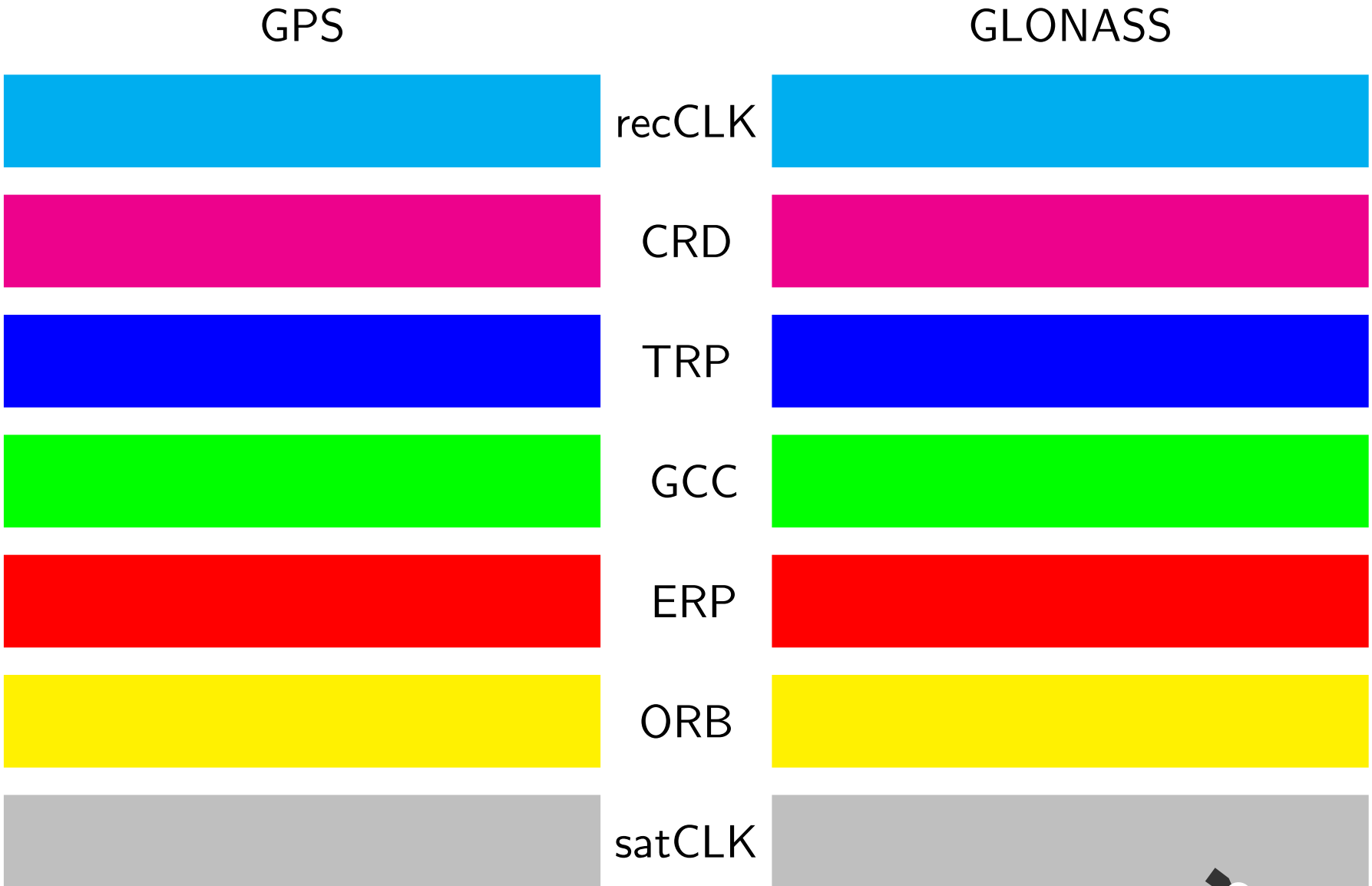
Levels of Multi-GNSS Analysis



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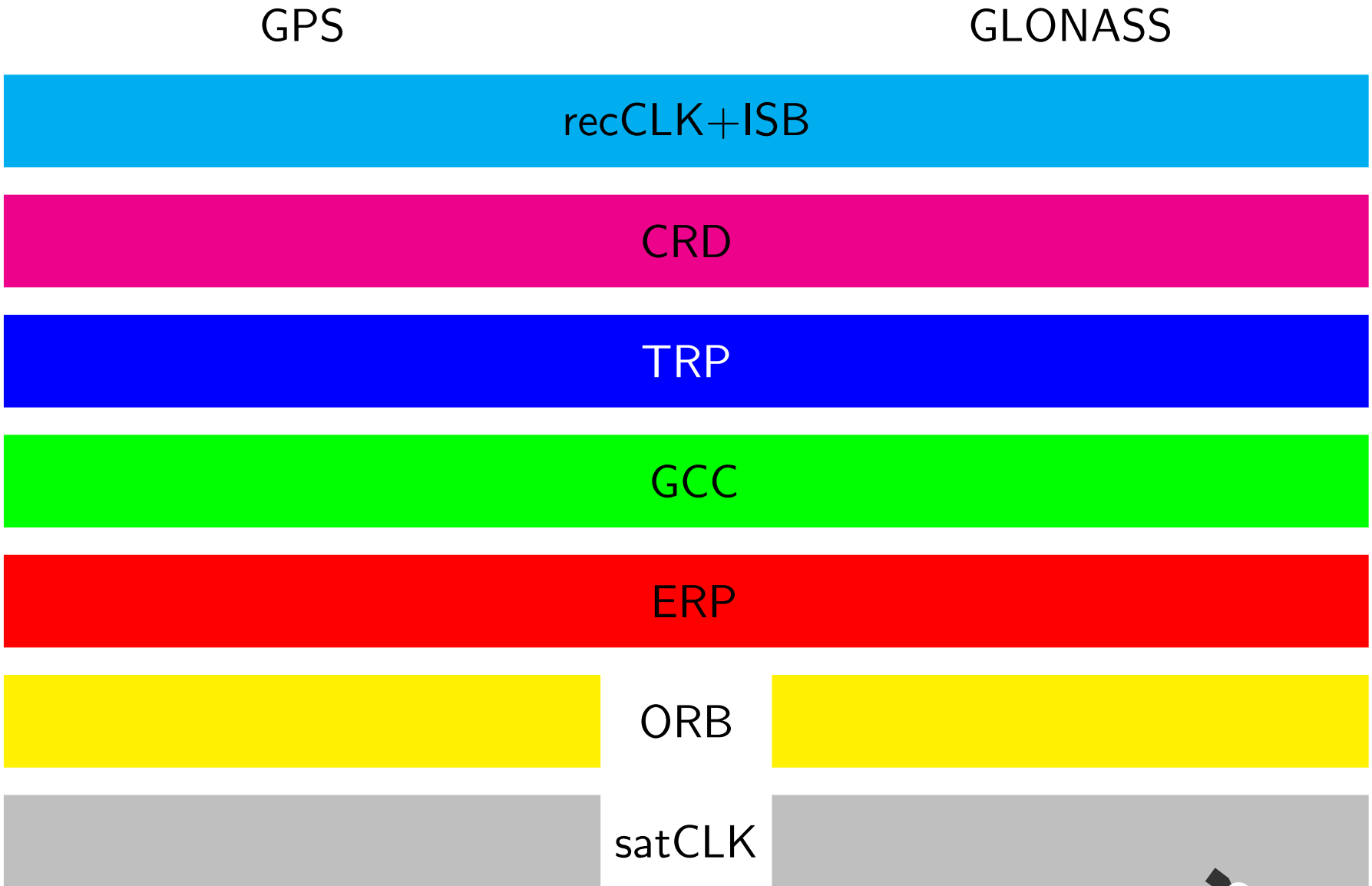

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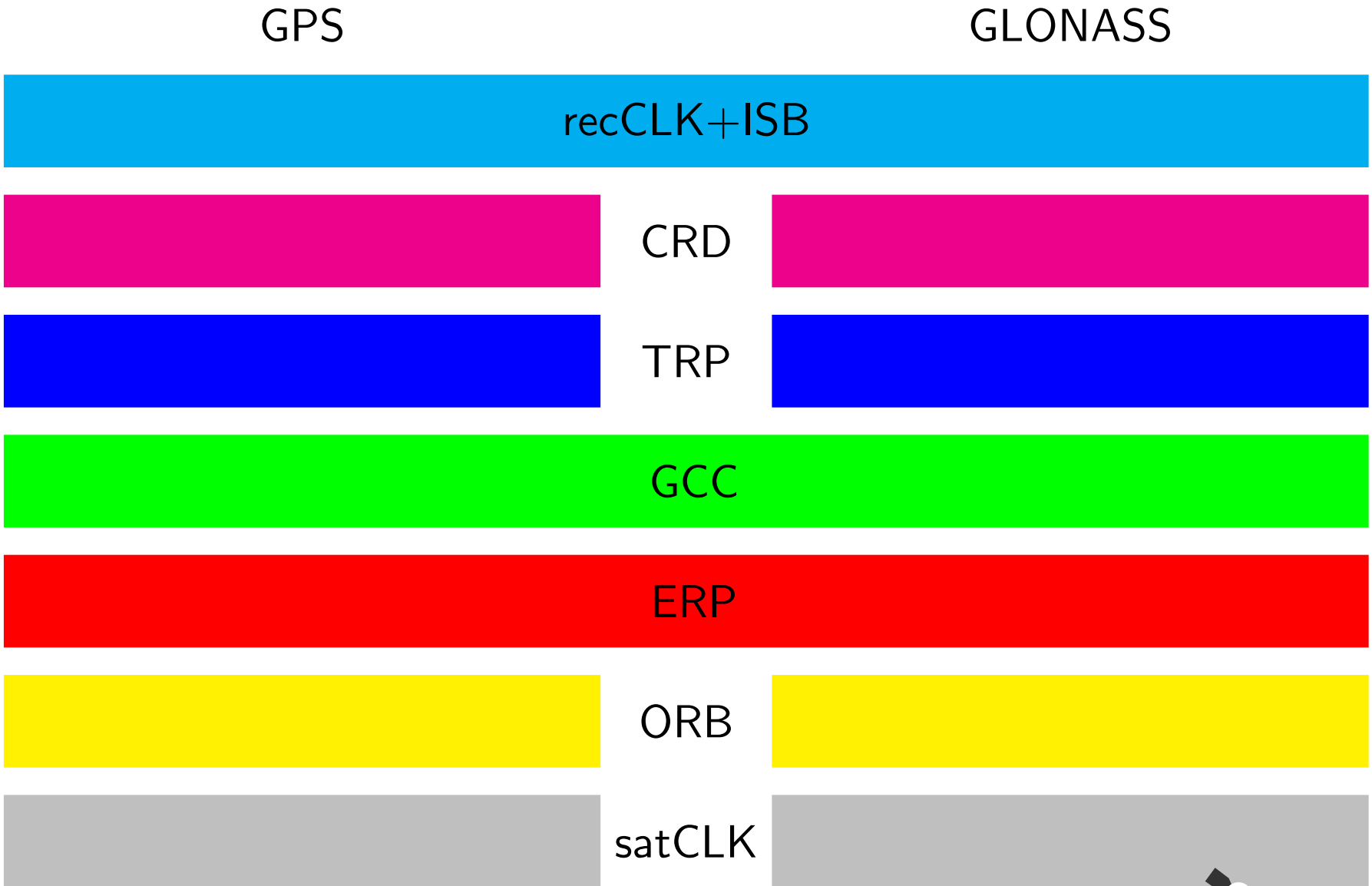

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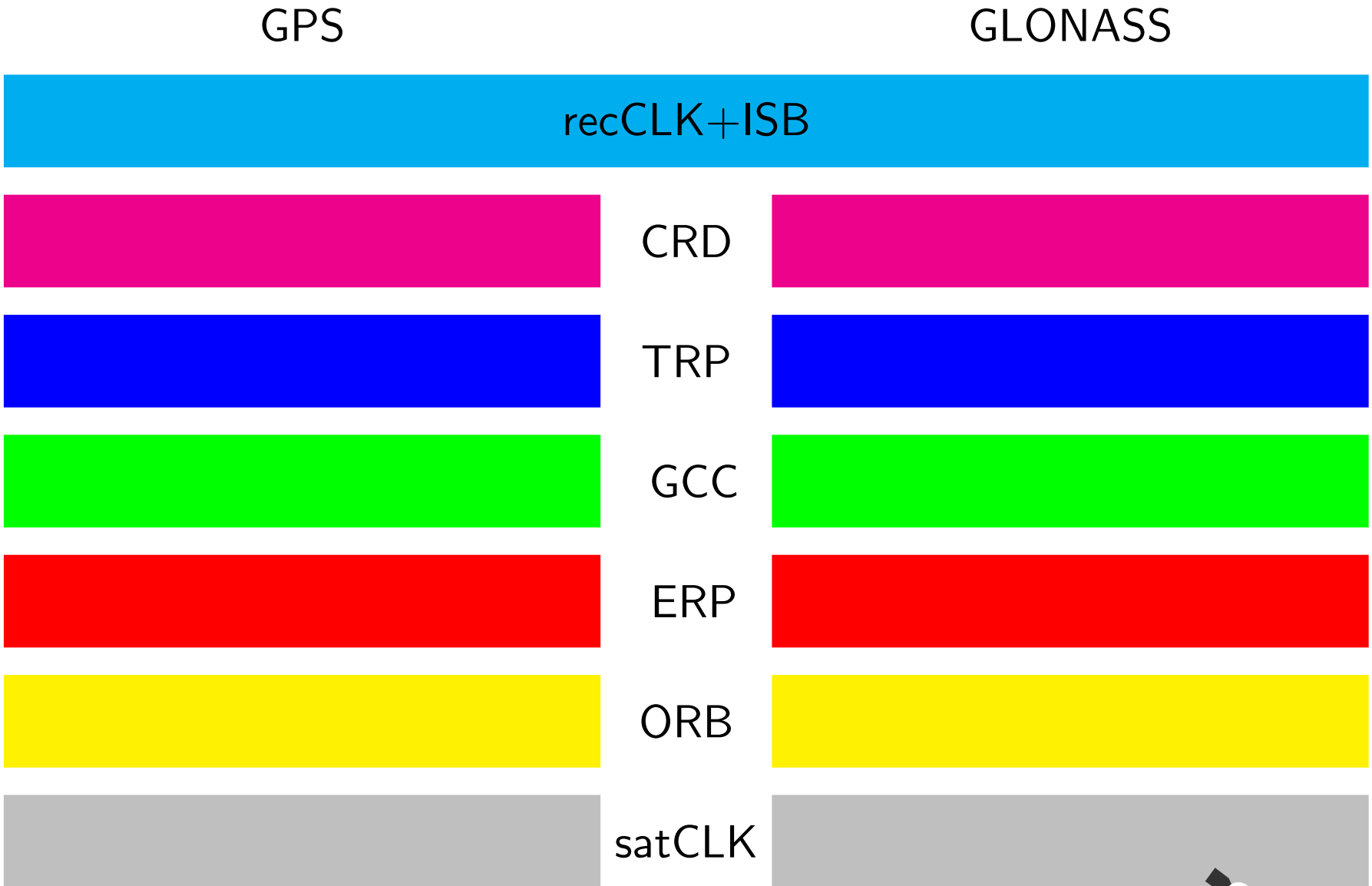

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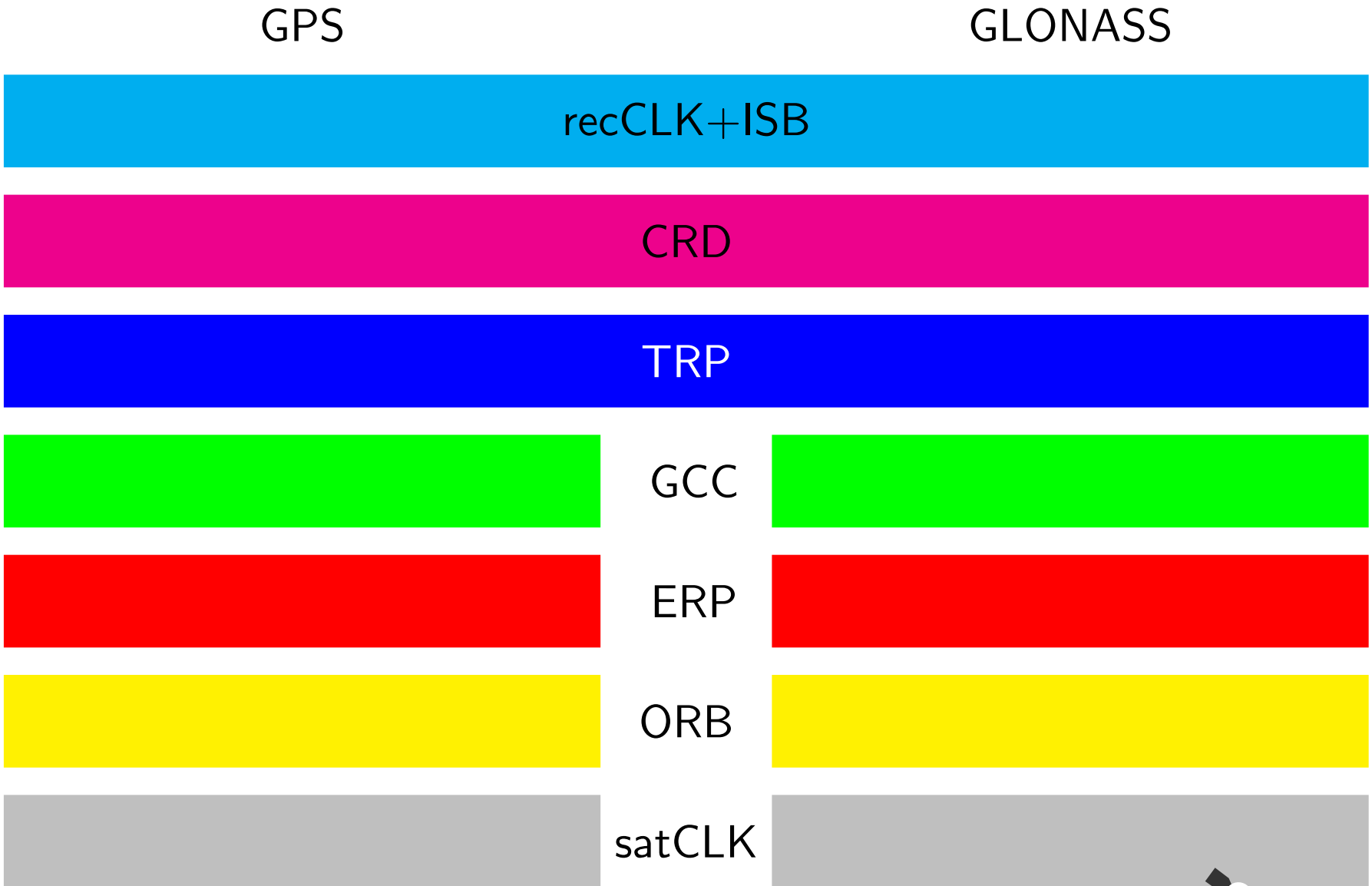

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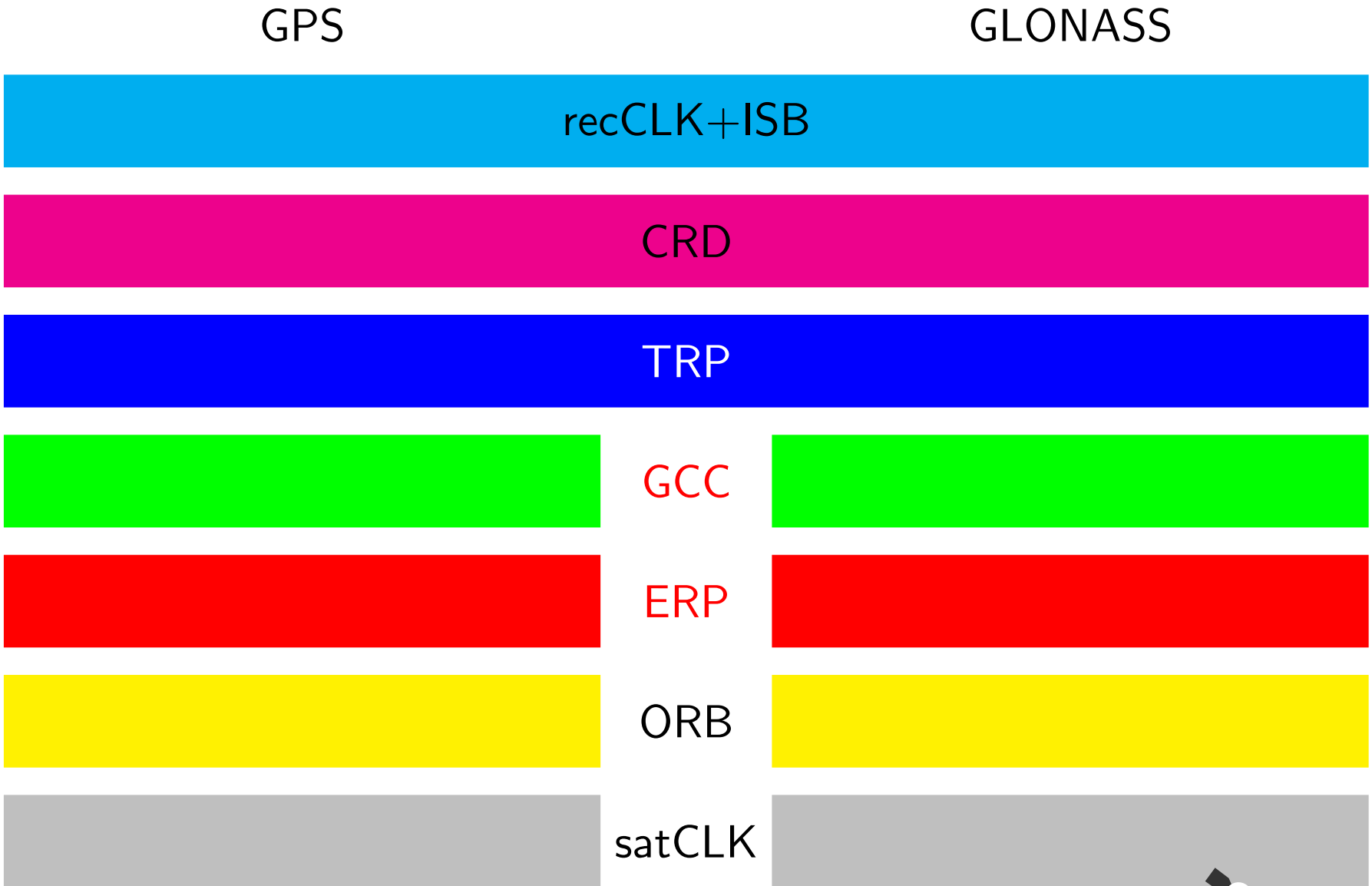

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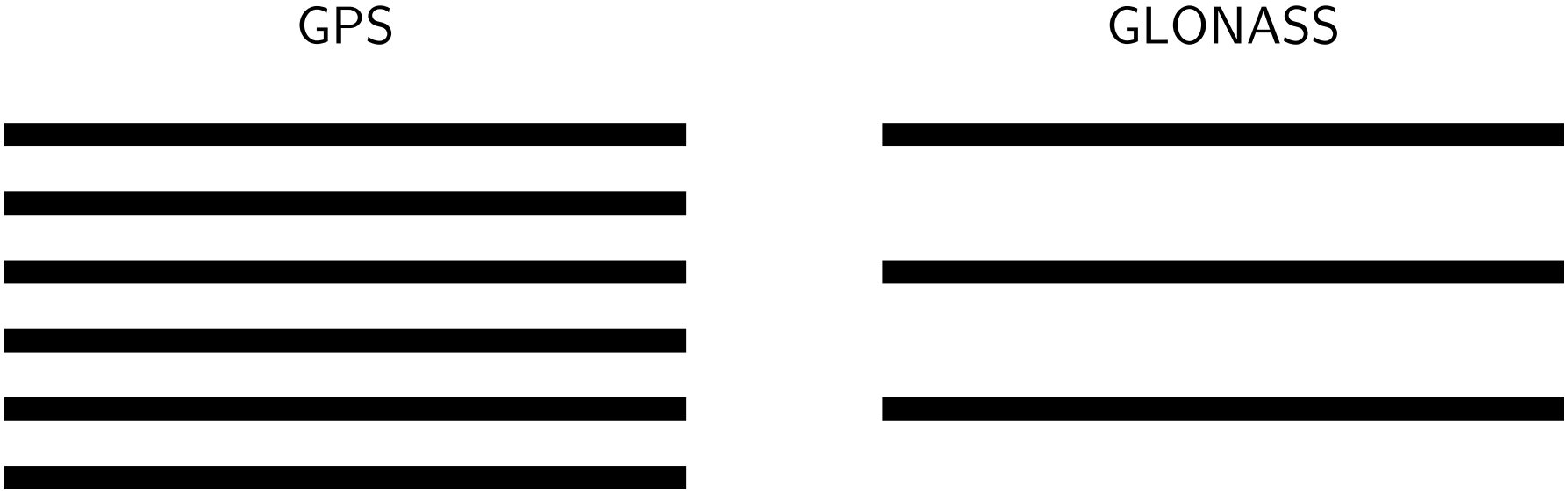

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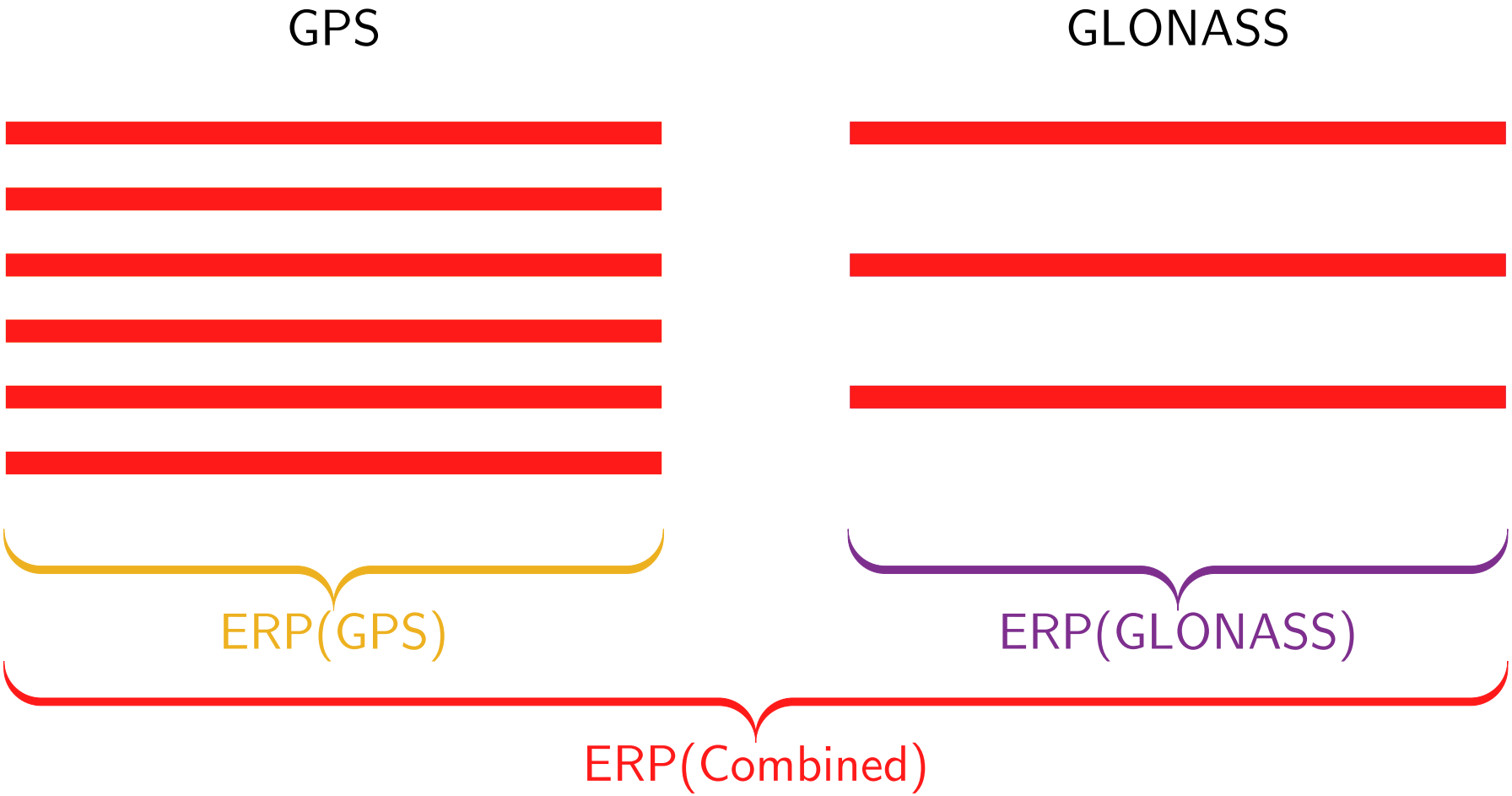

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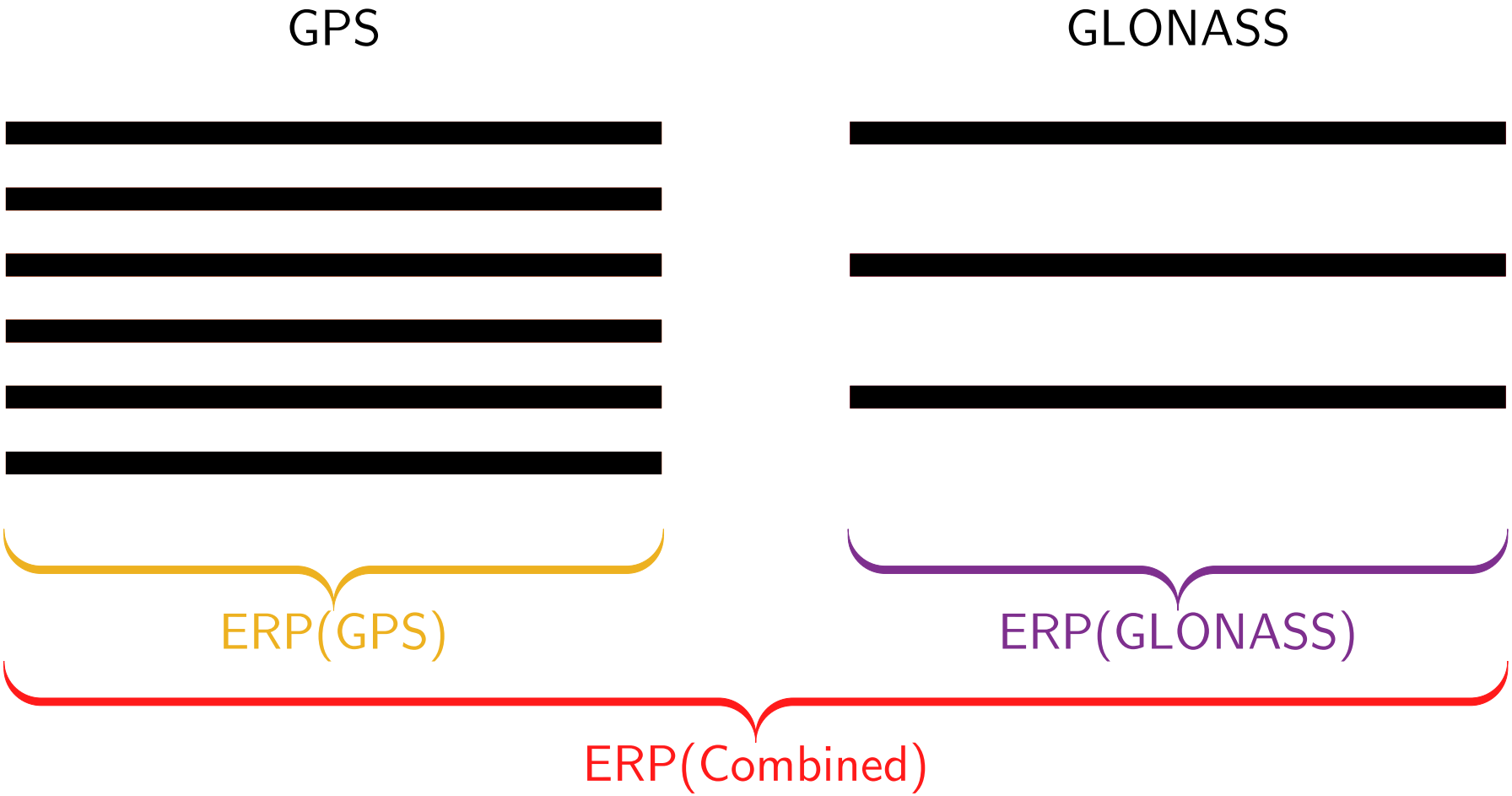

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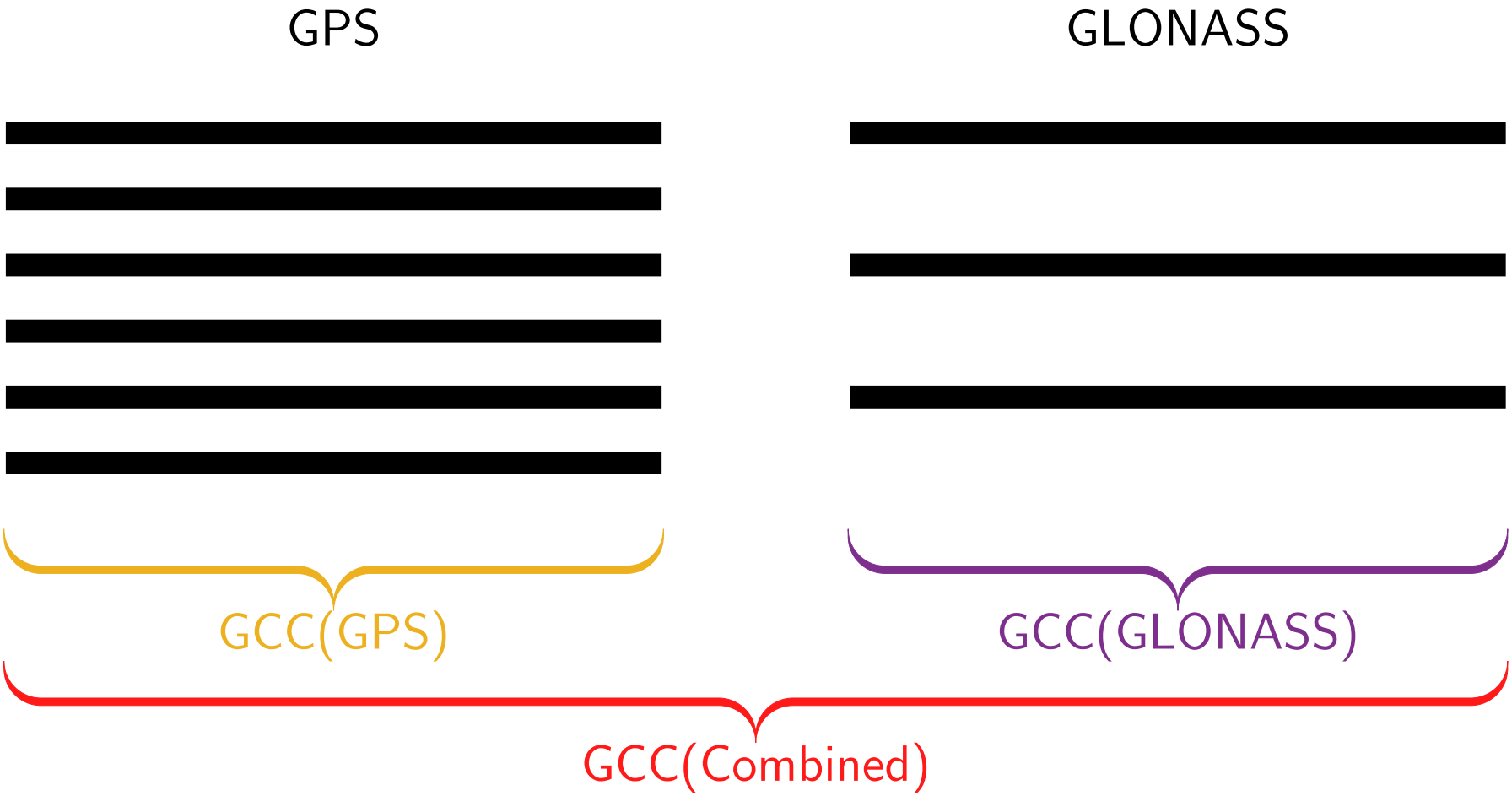

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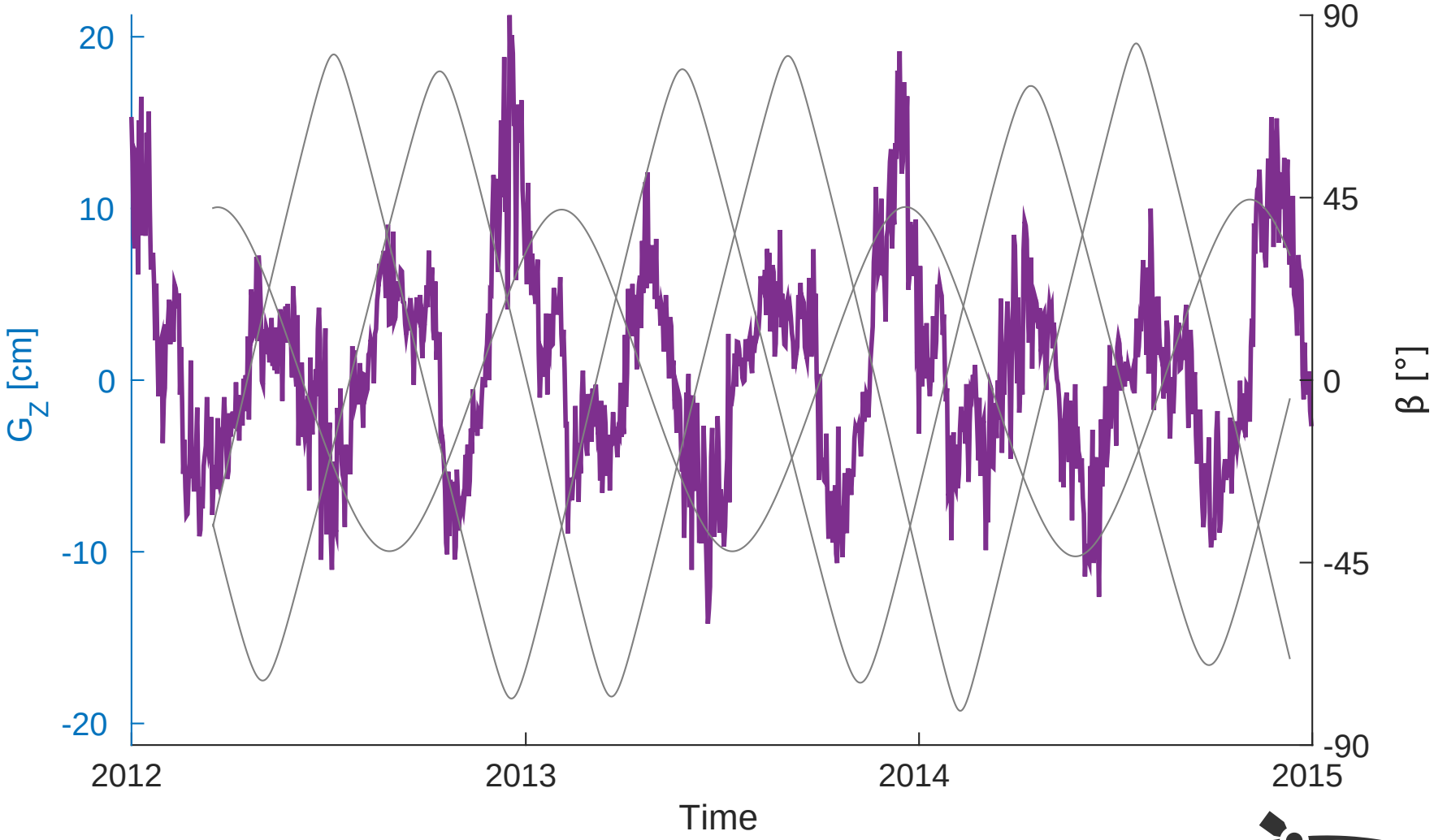

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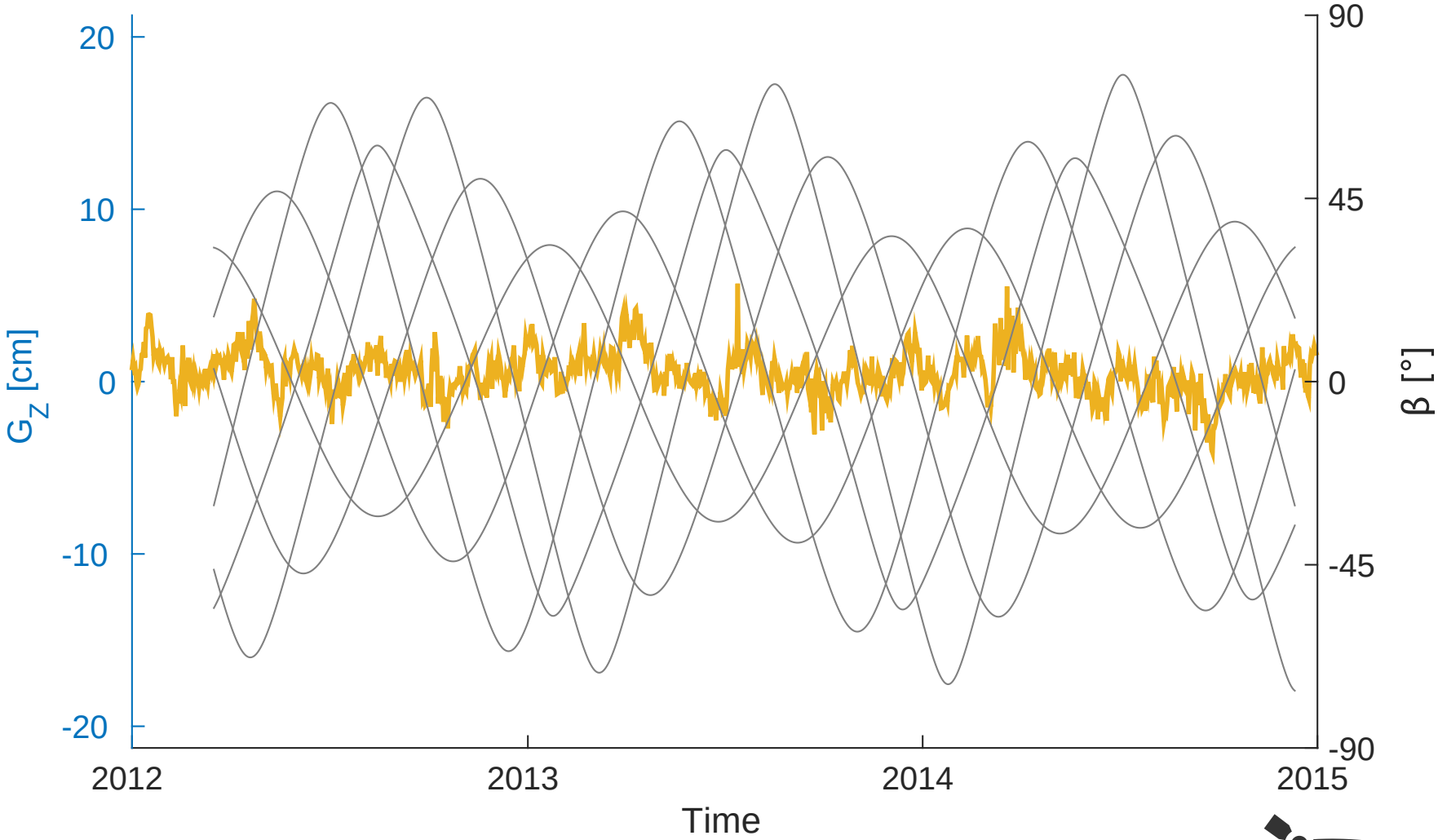

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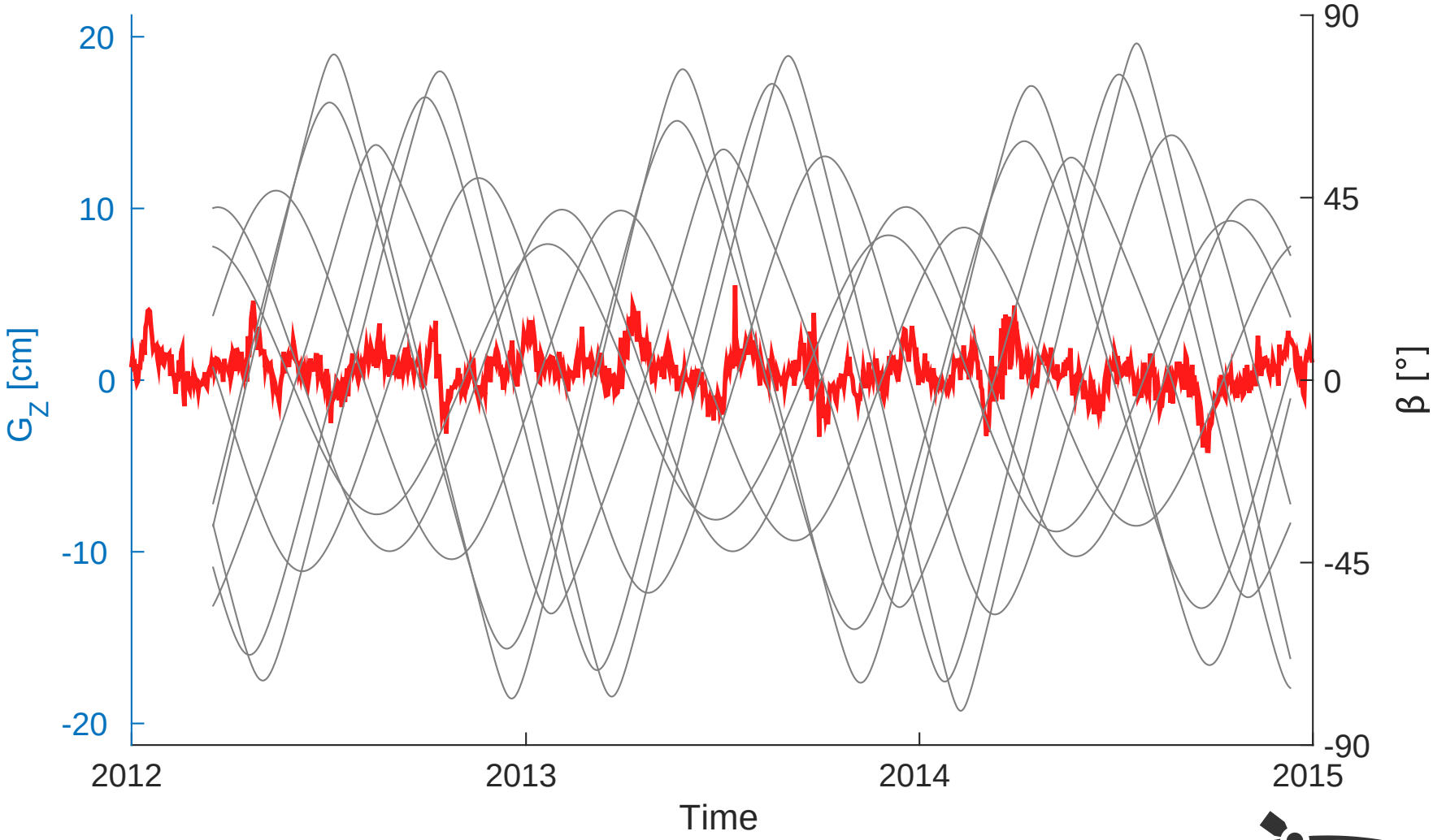

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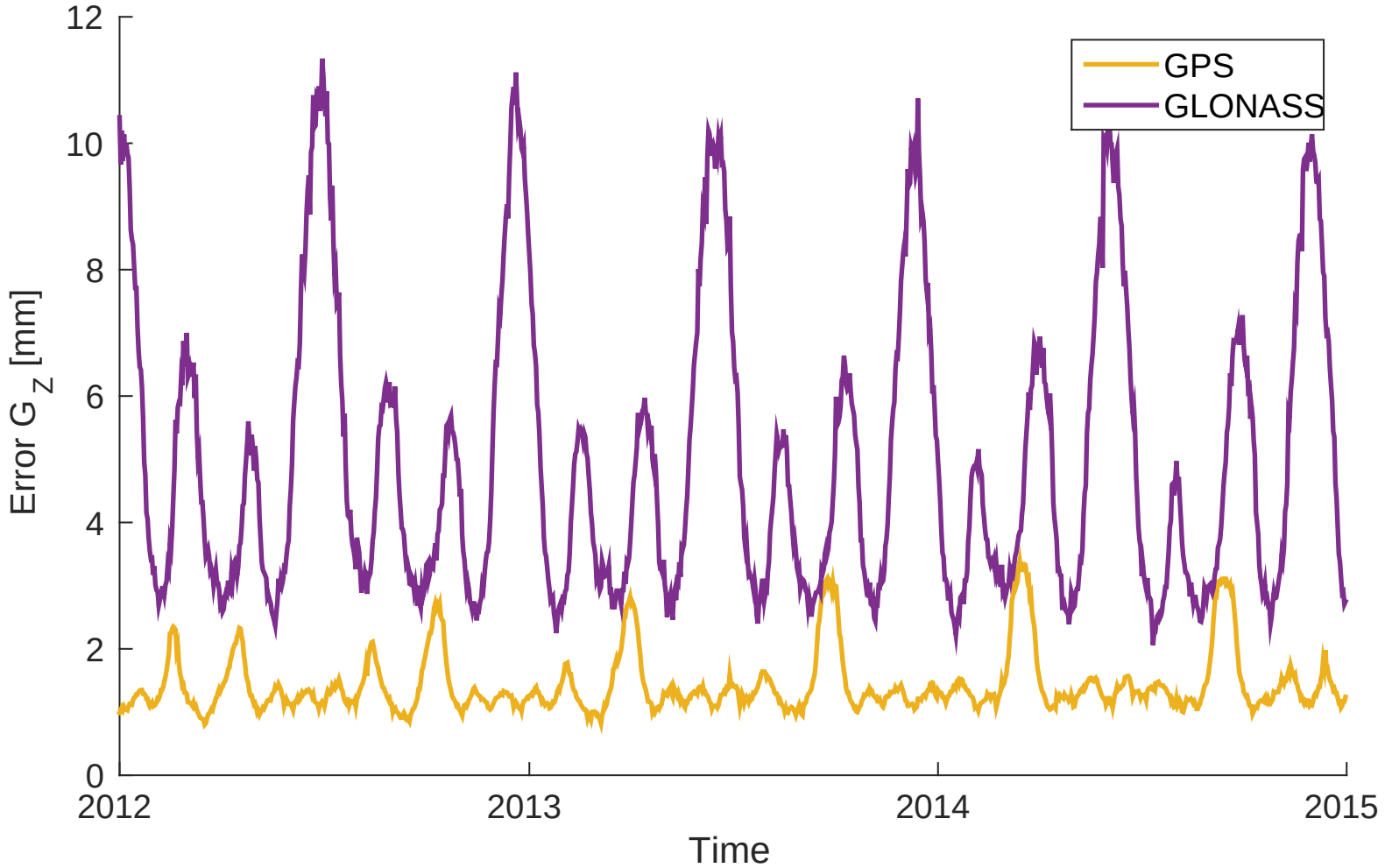

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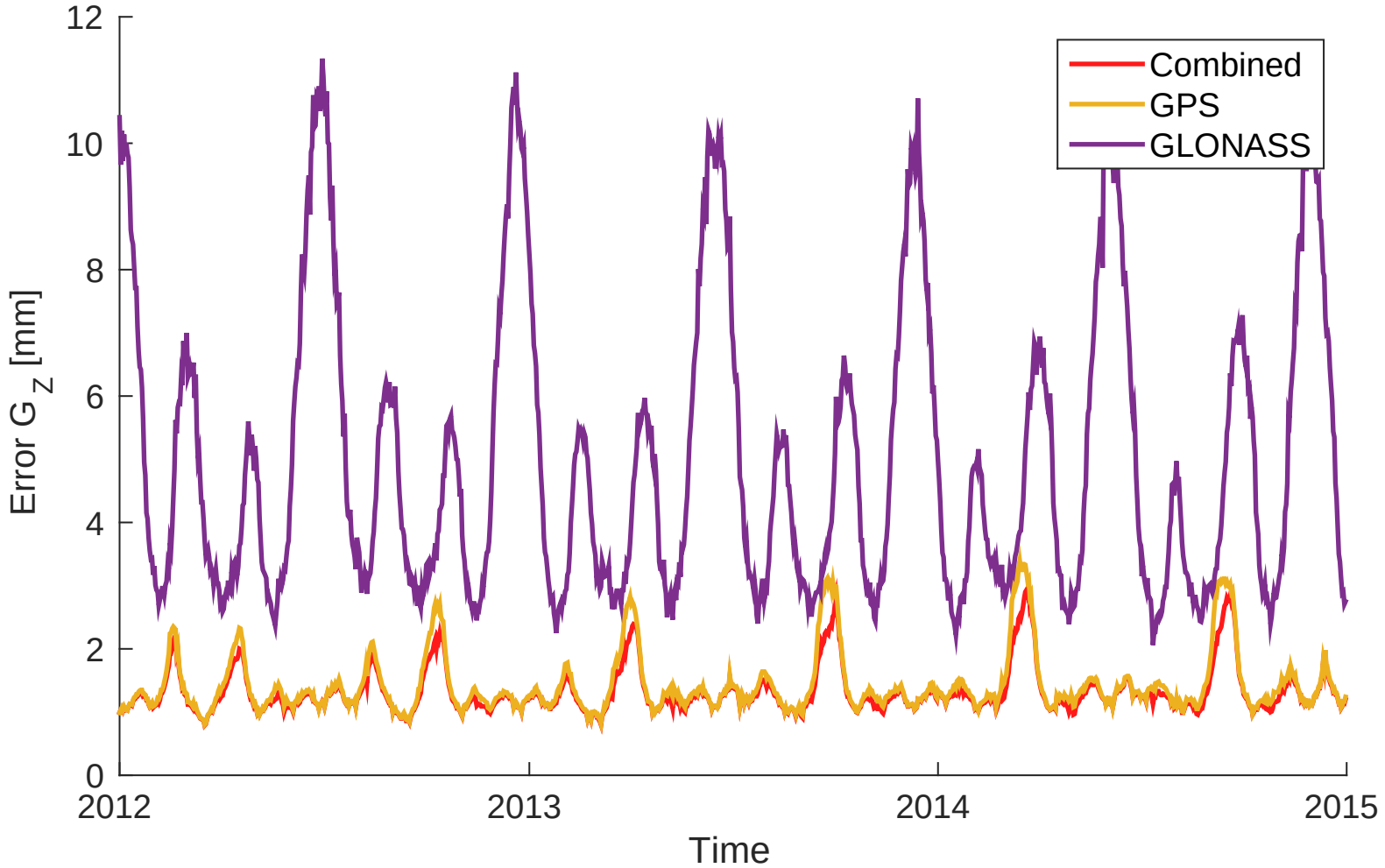

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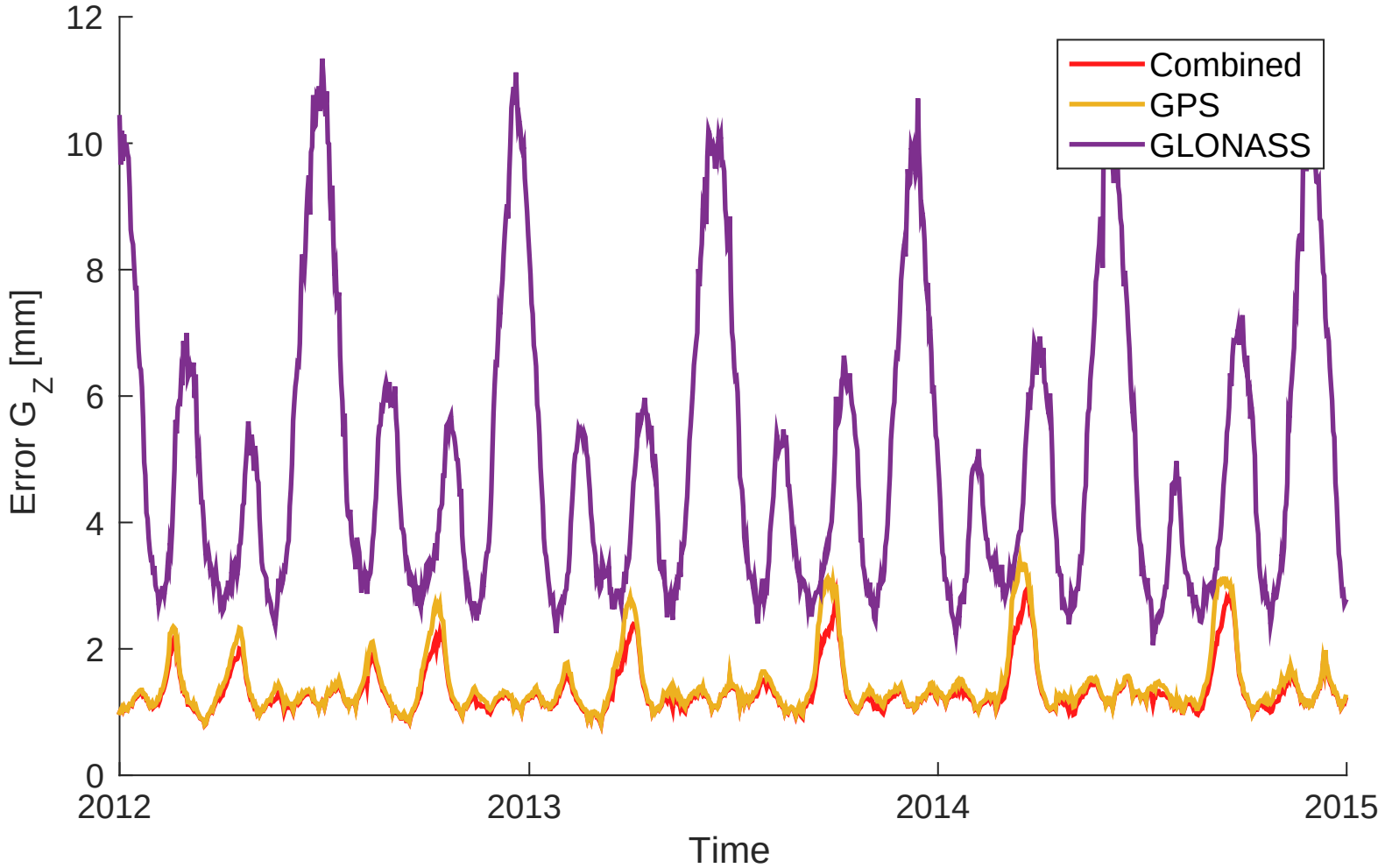

In full agreement to Meindl et al., 2013: DOI 10.1016/j.asr.2012.10.026.

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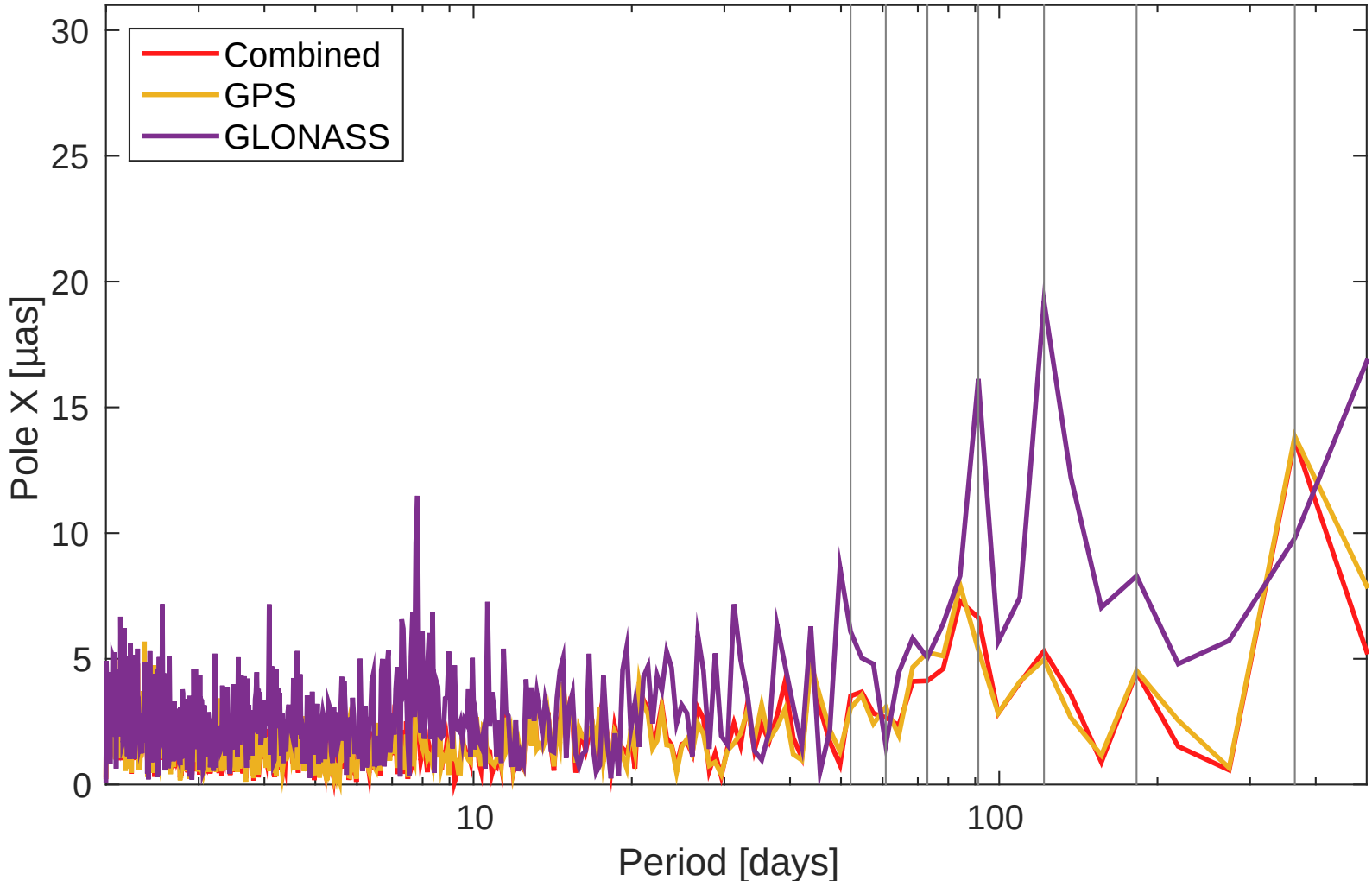
Amplitude spectra from ERP estimates: X component



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Earth Rotation Parameters

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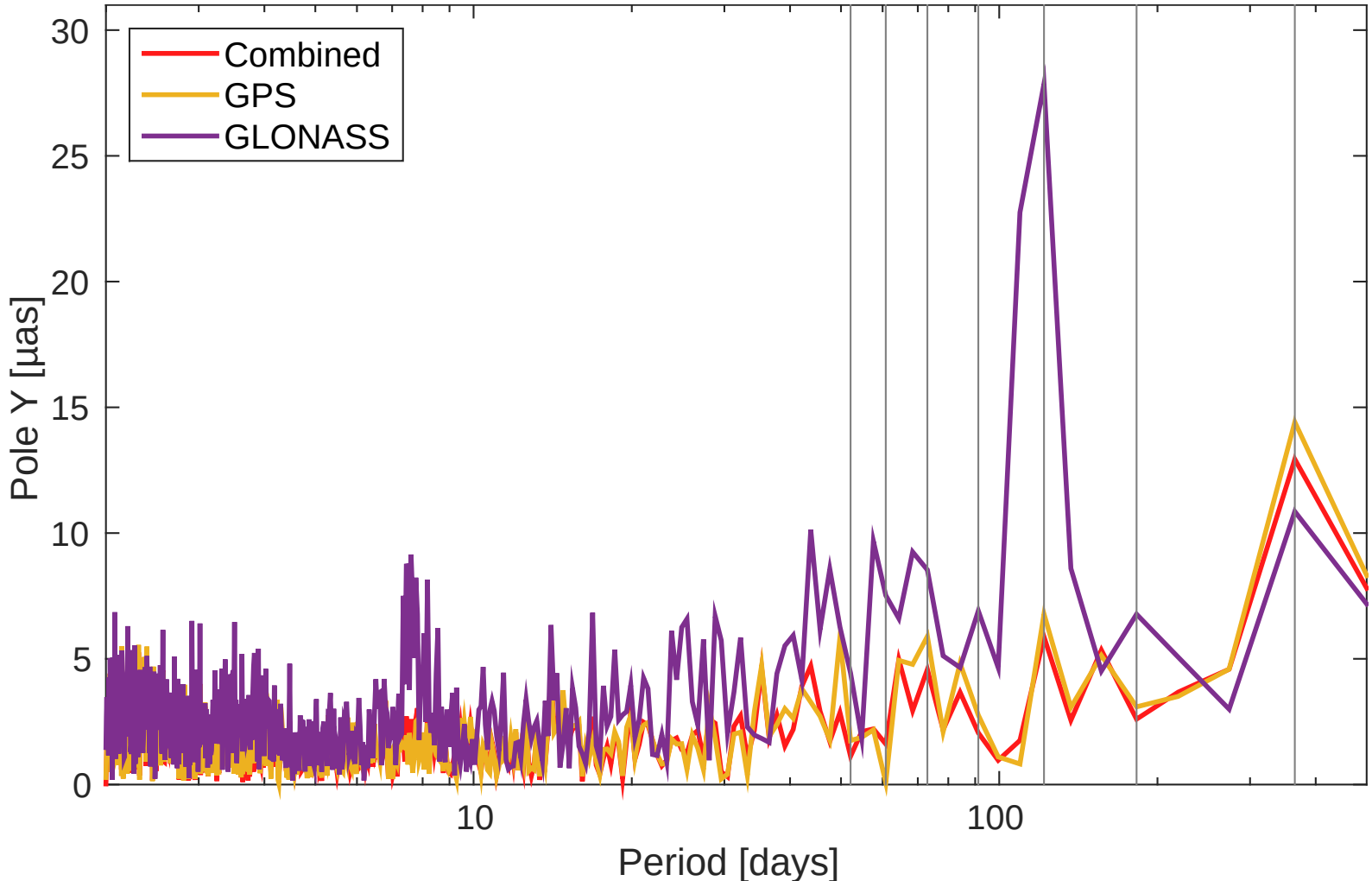

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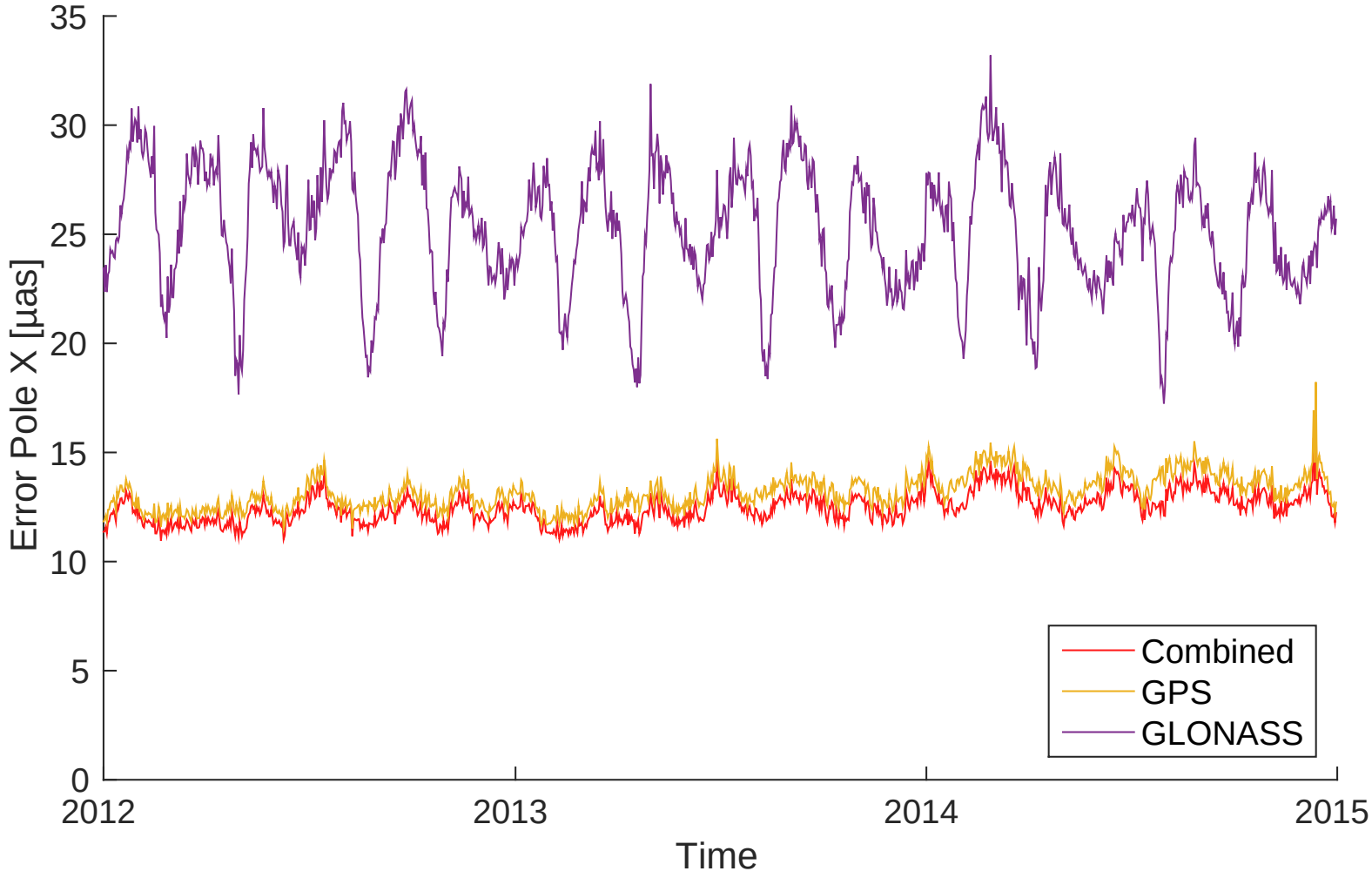

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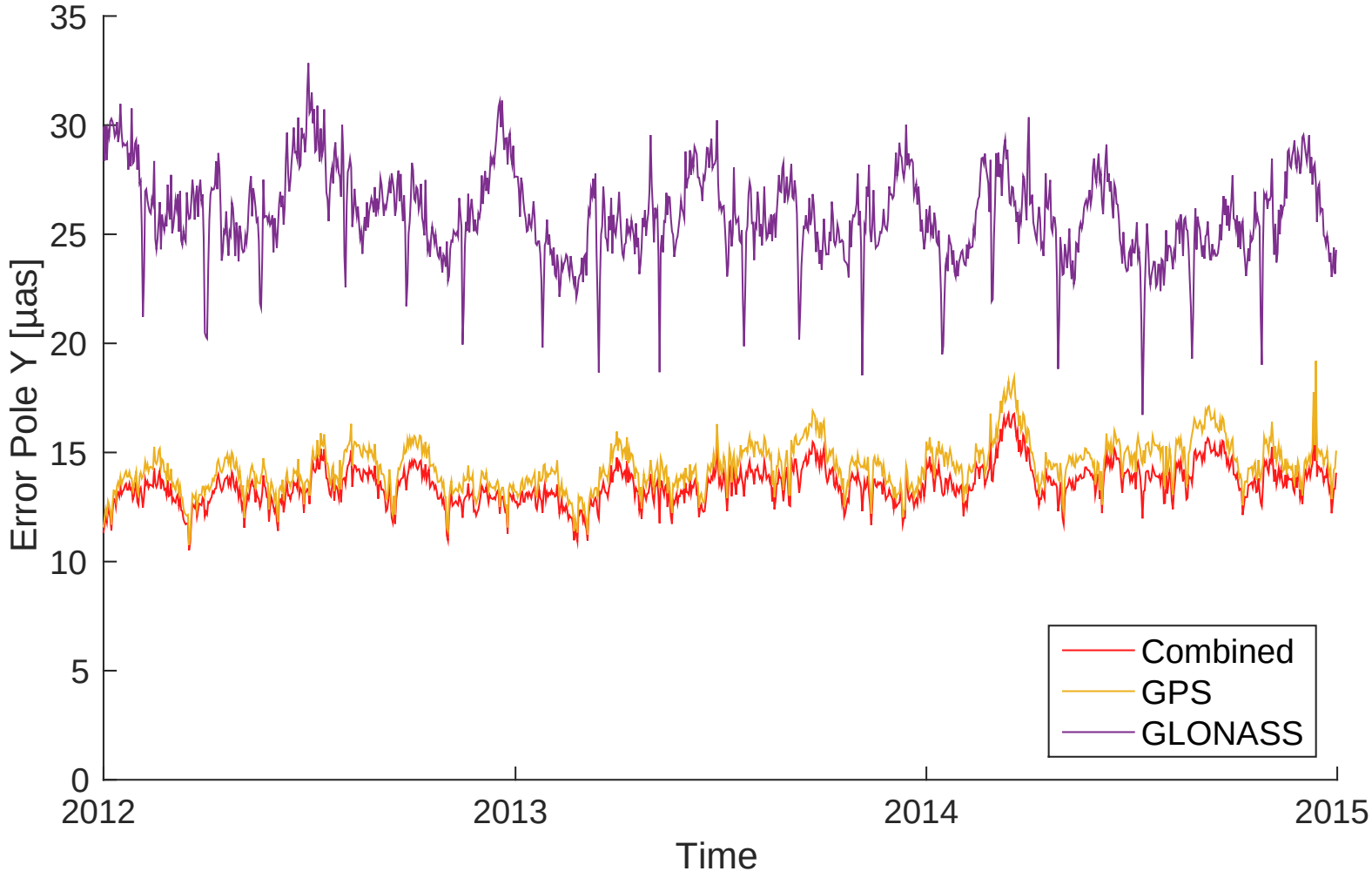

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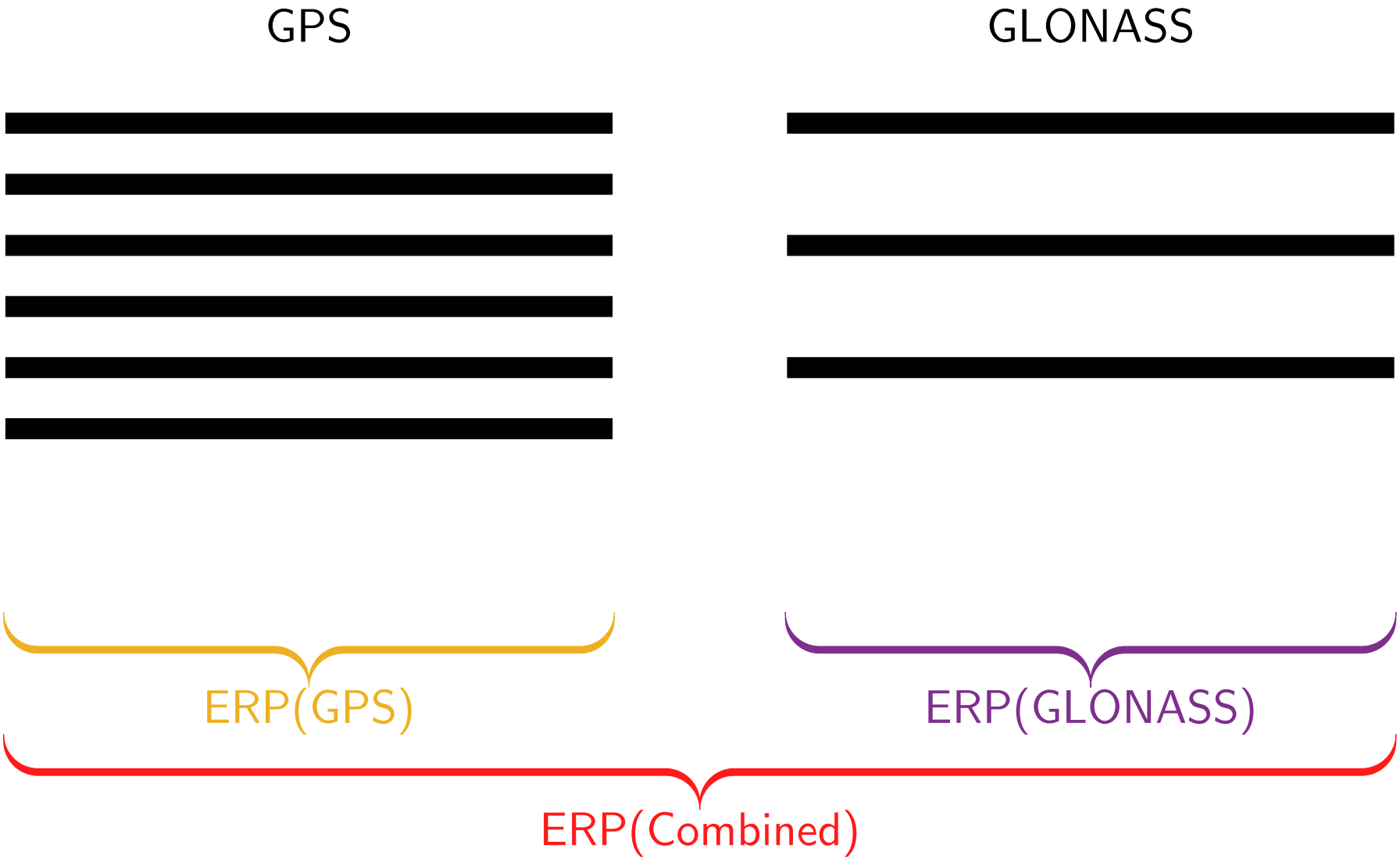

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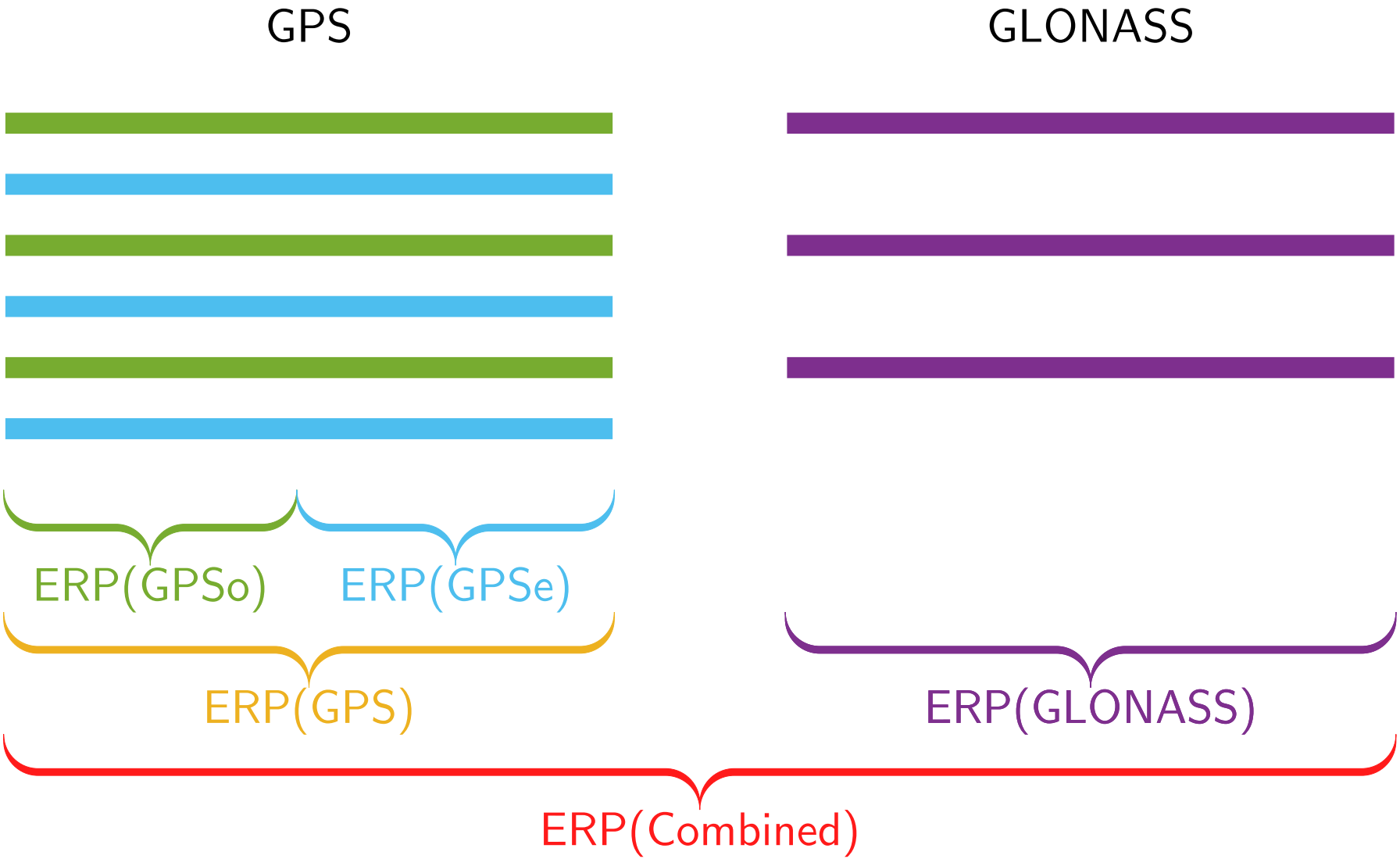

GPS: Two Three-Plane Constellations

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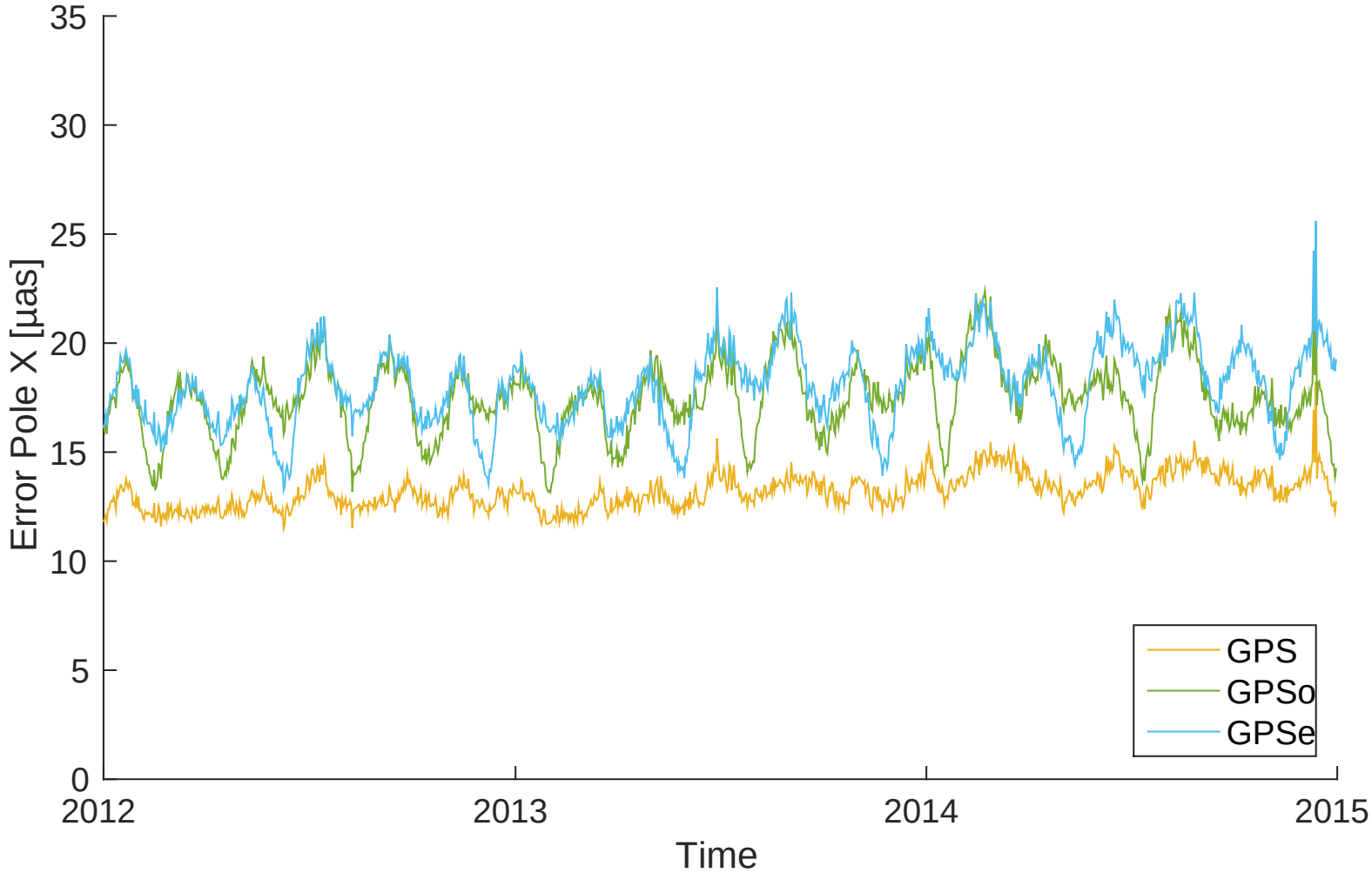

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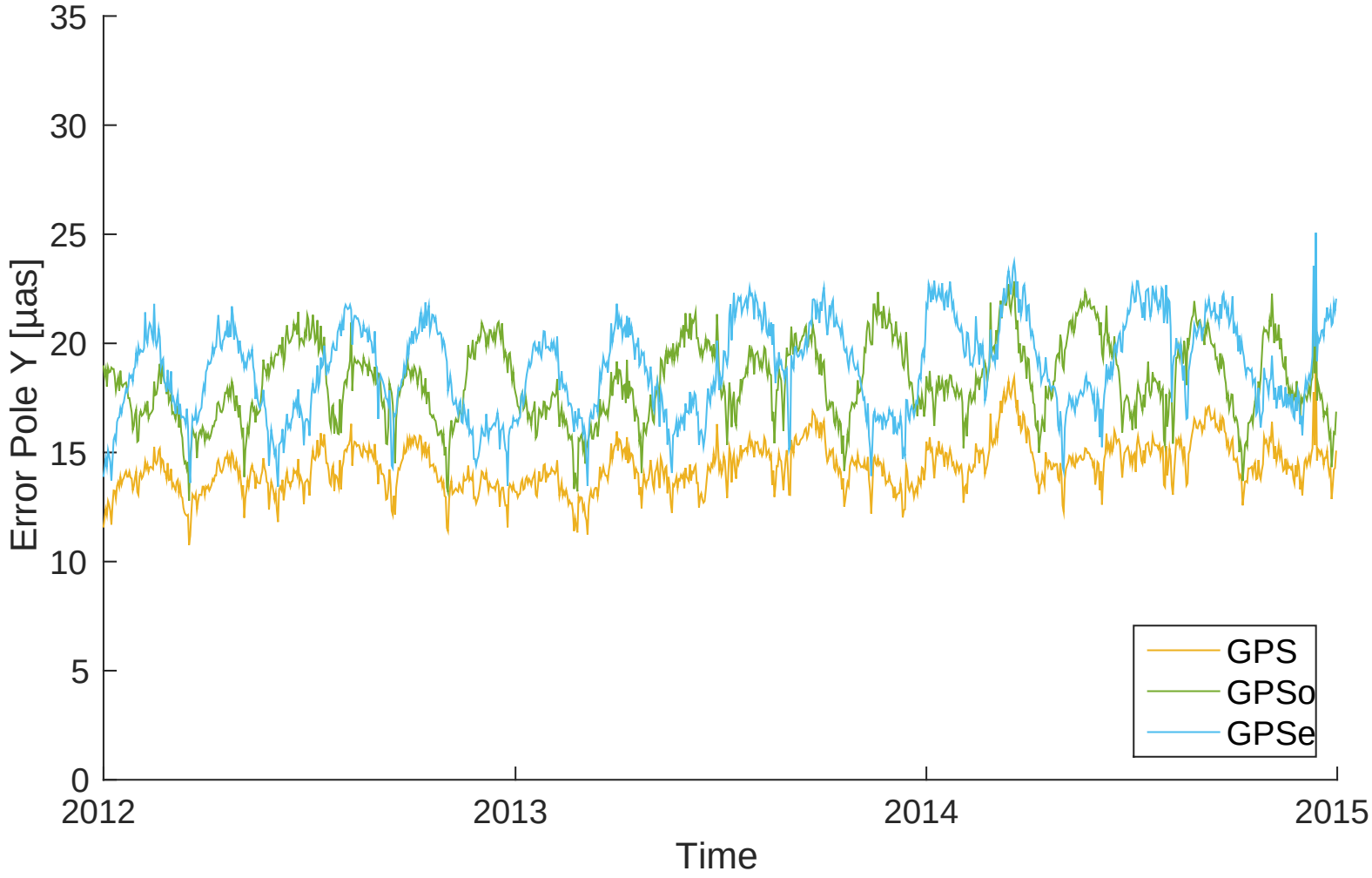

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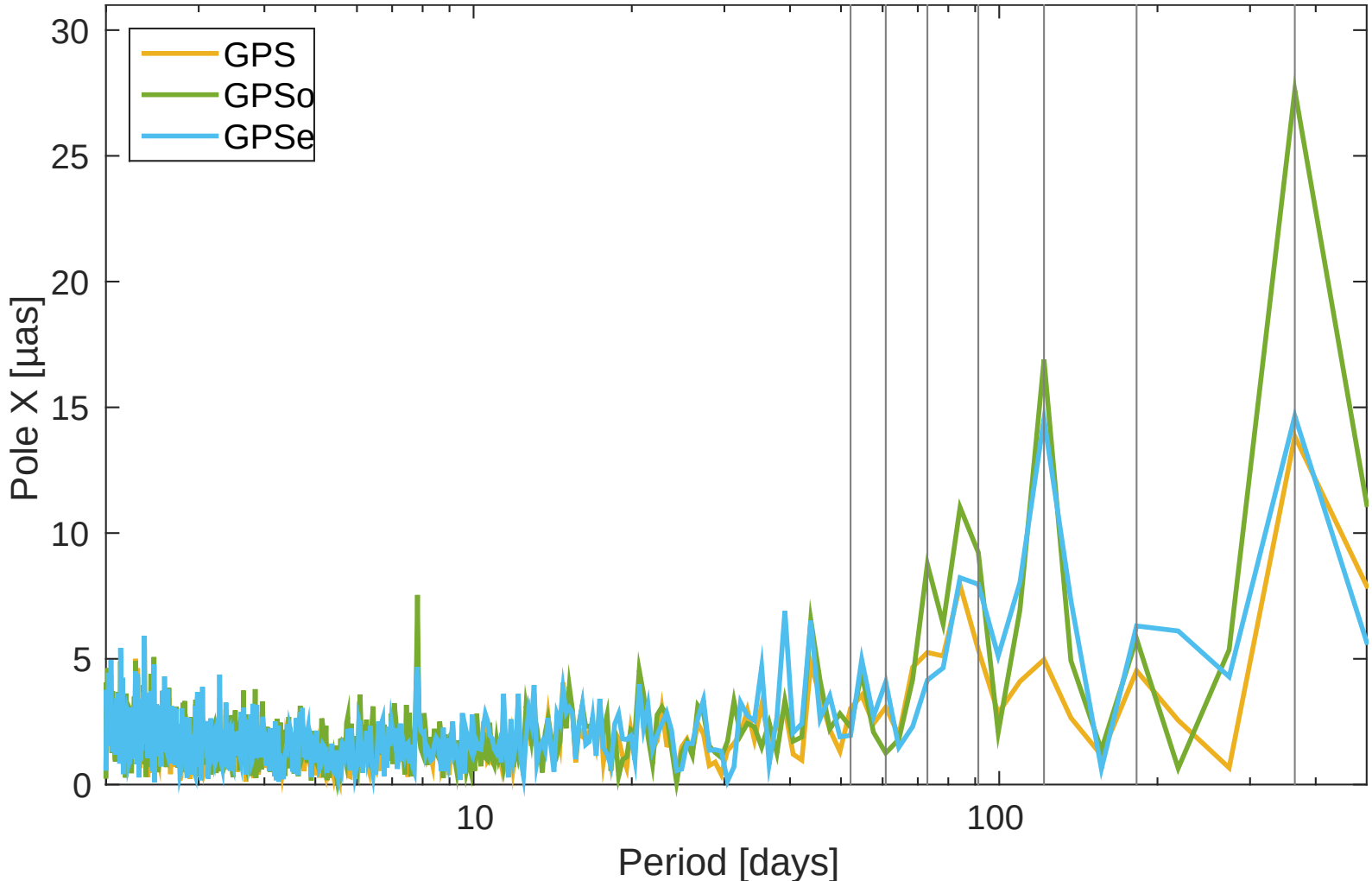

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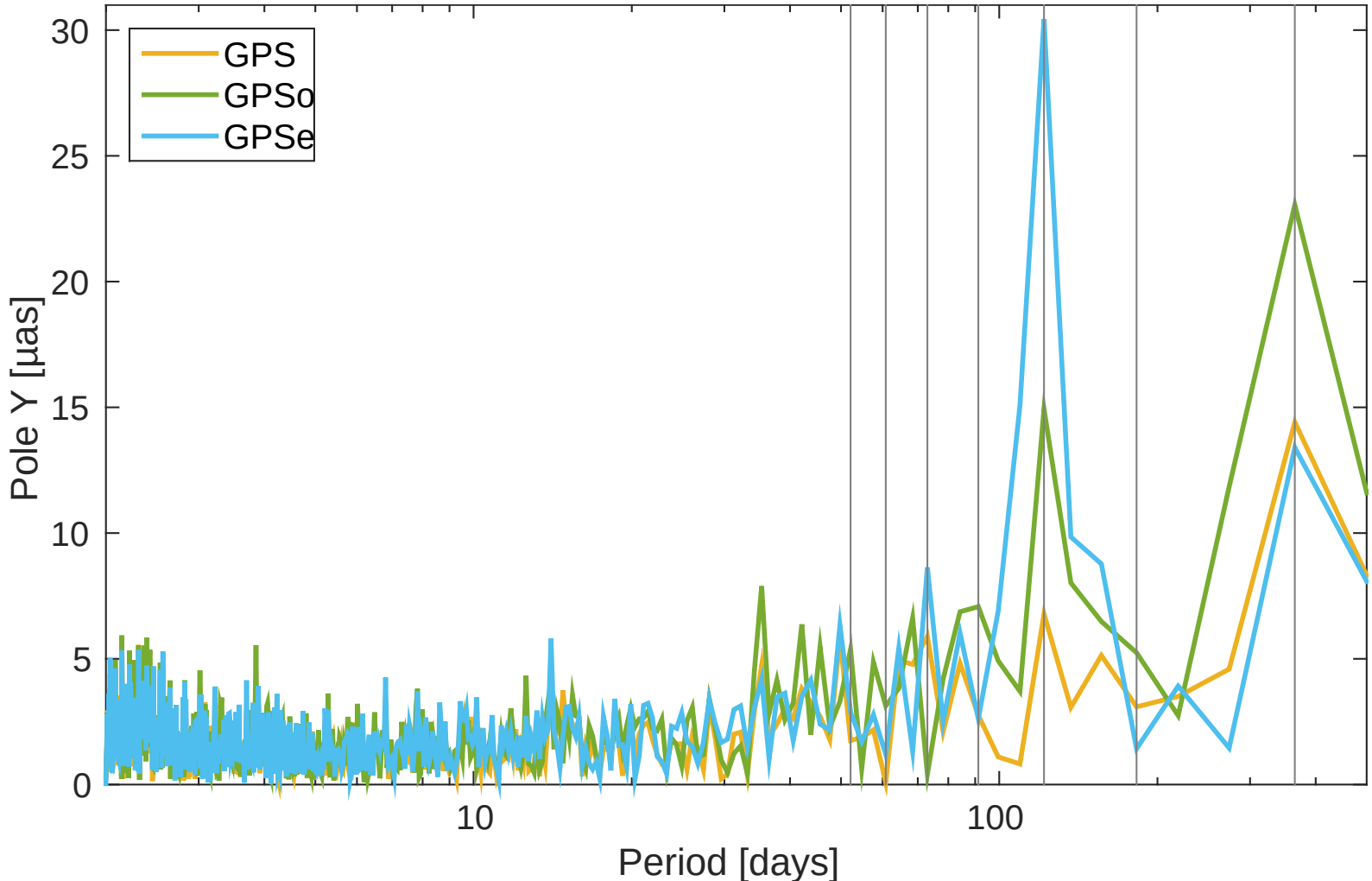

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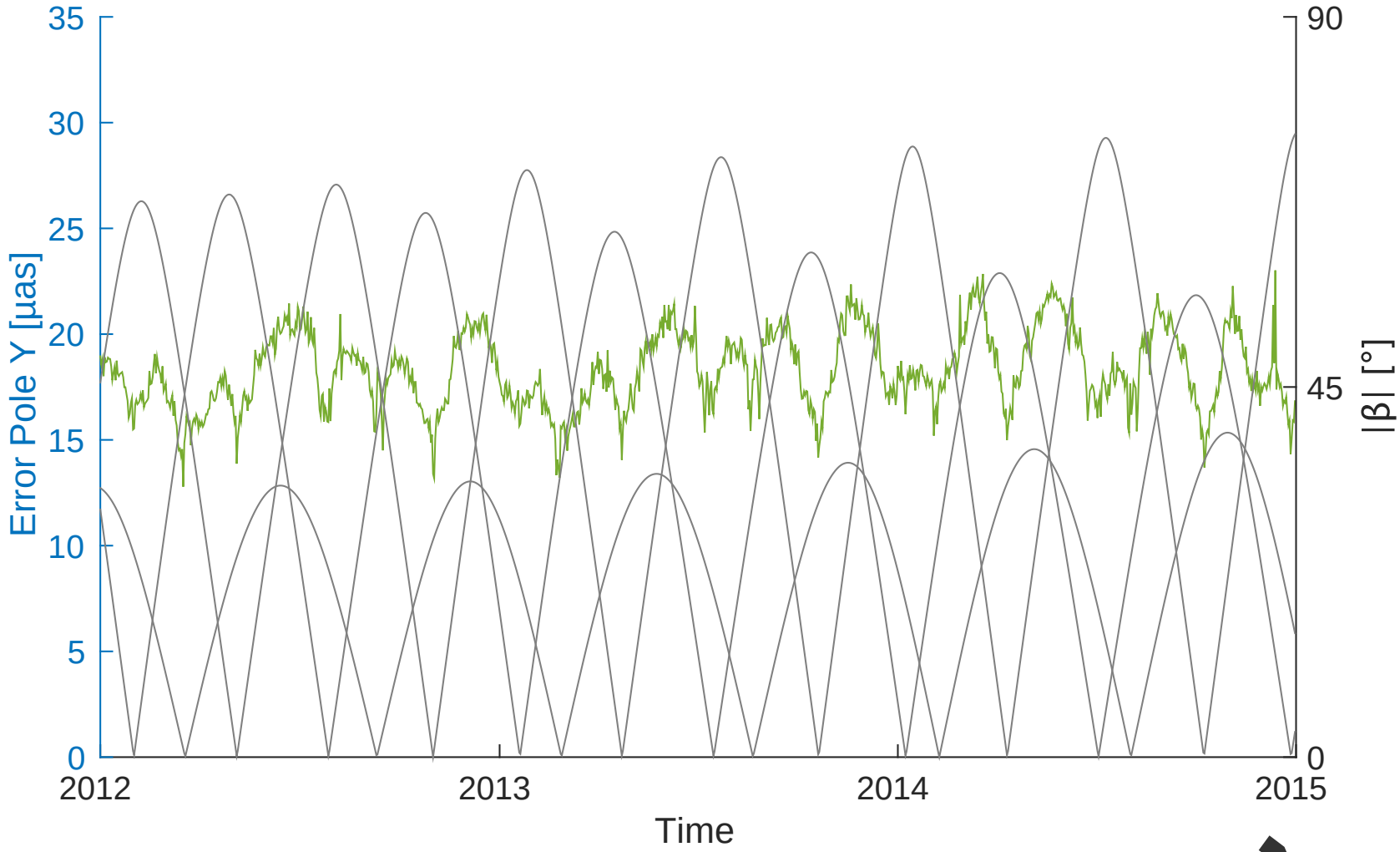

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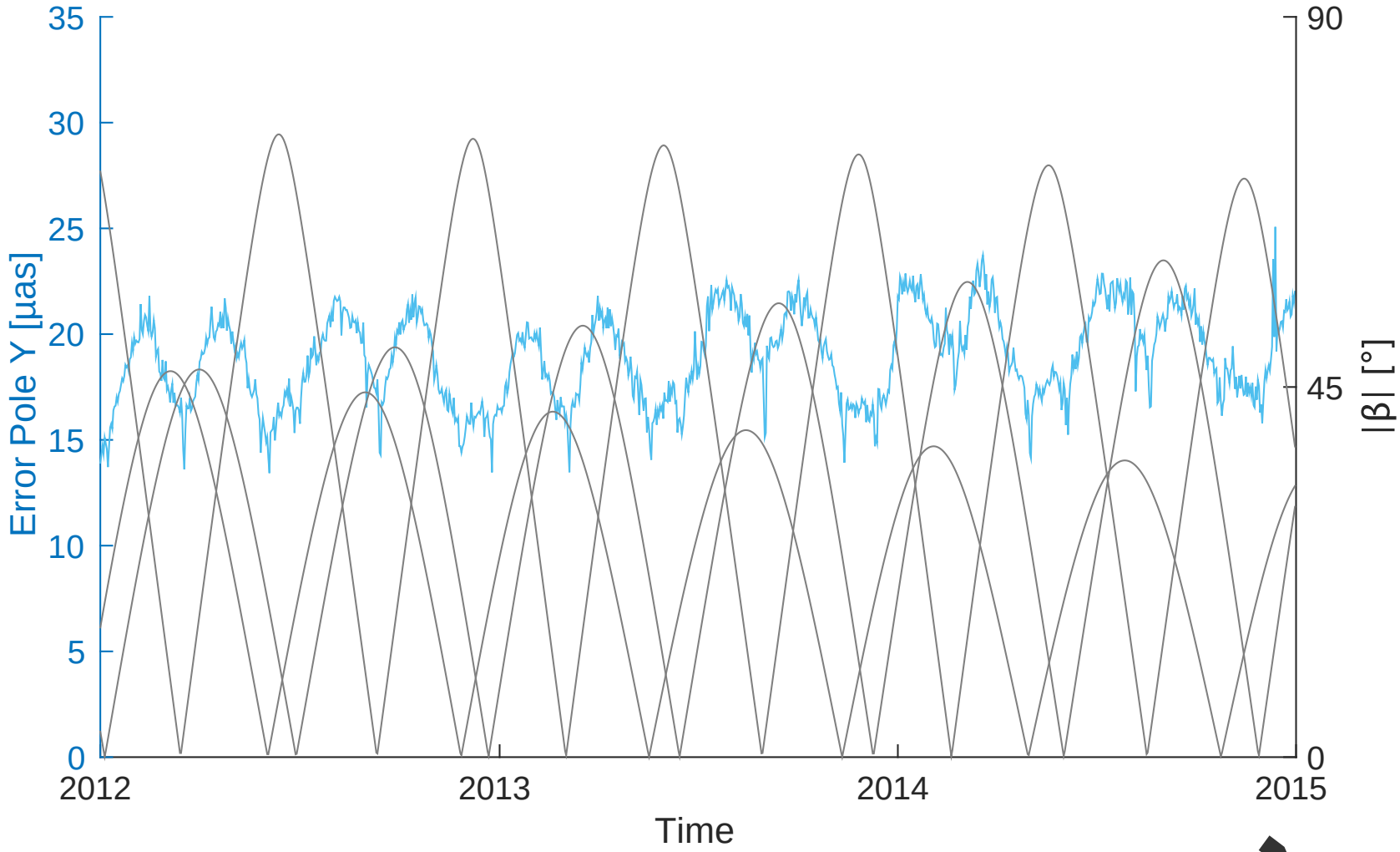

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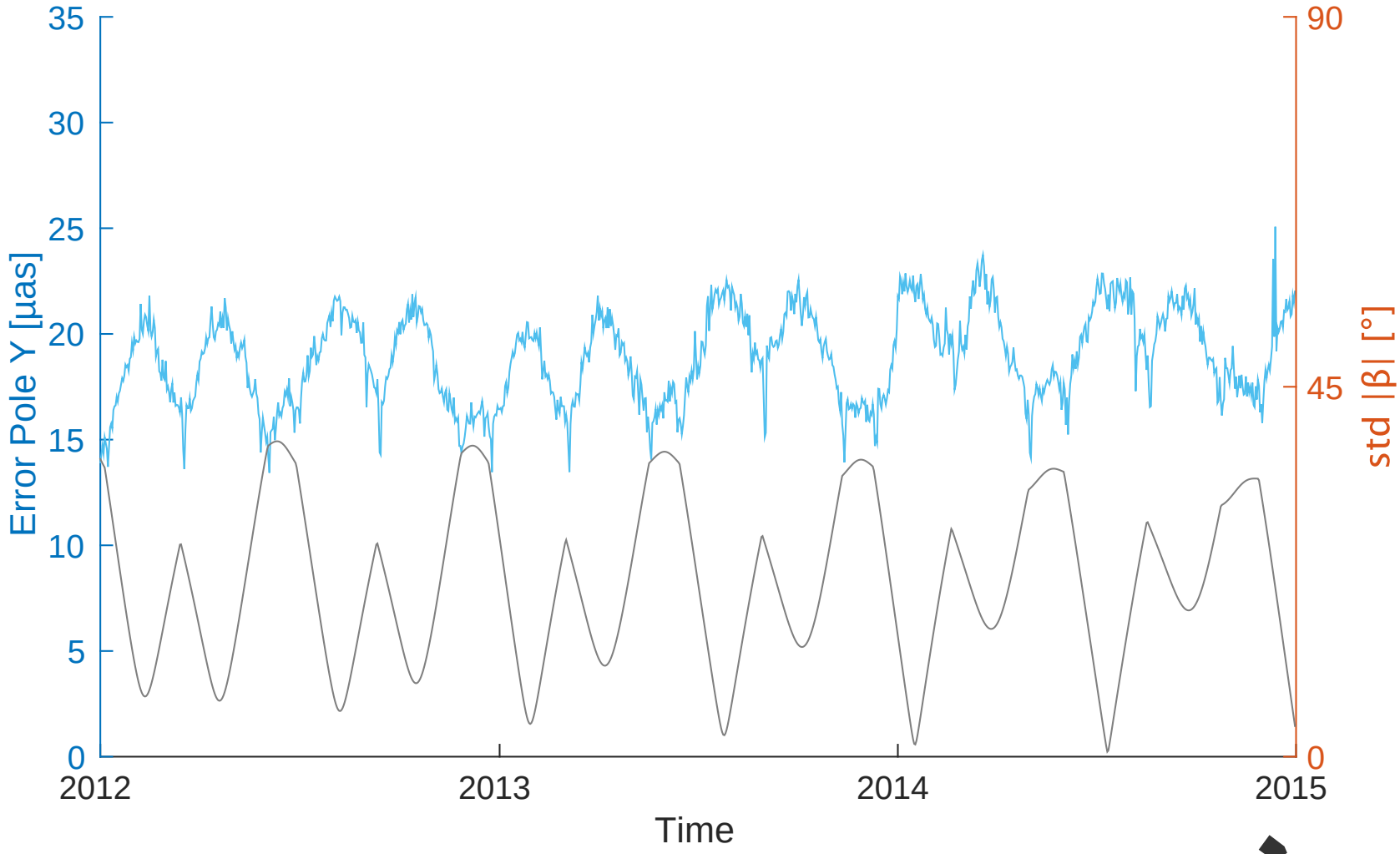

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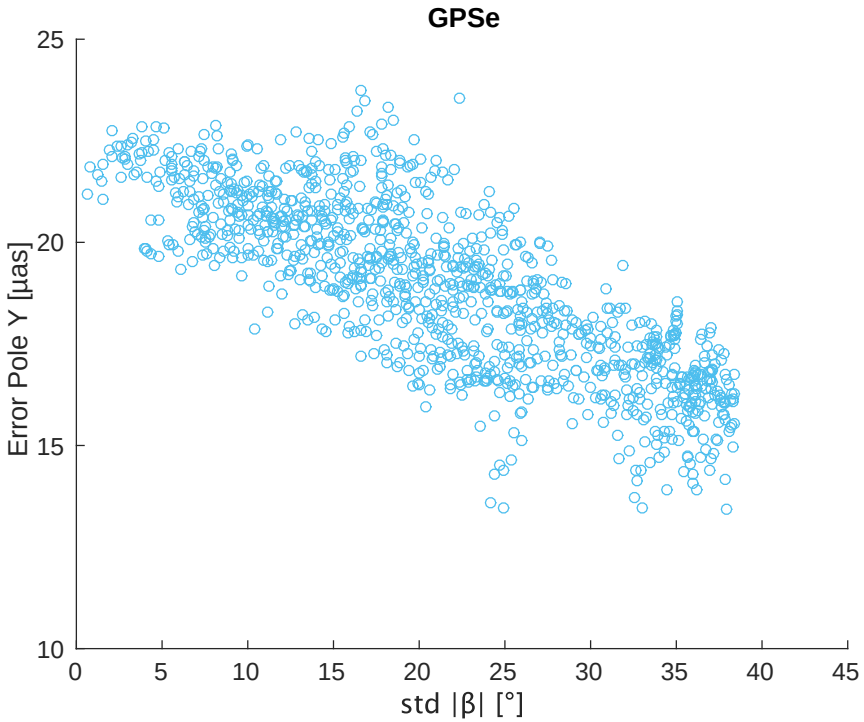

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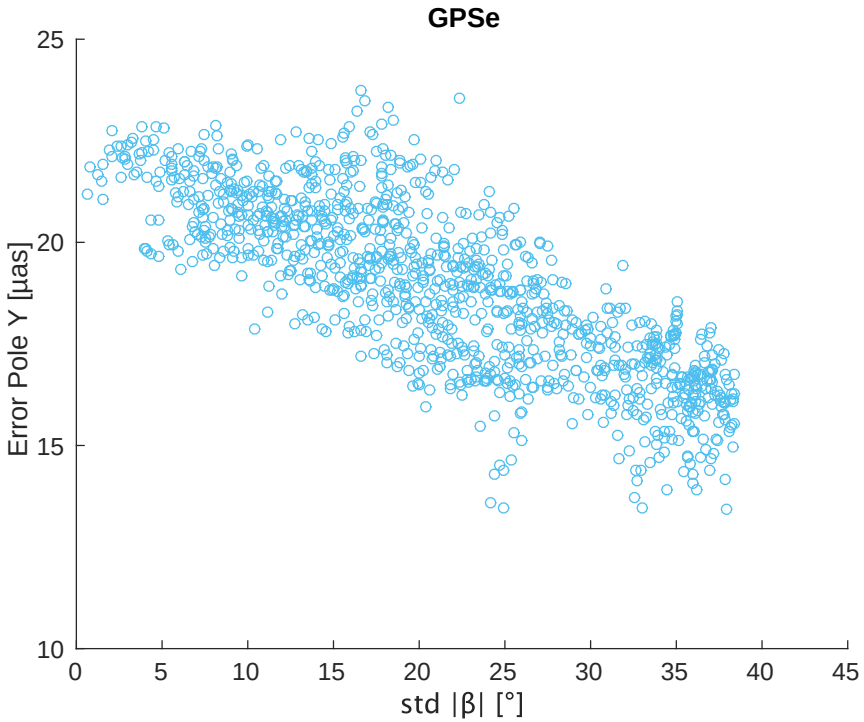

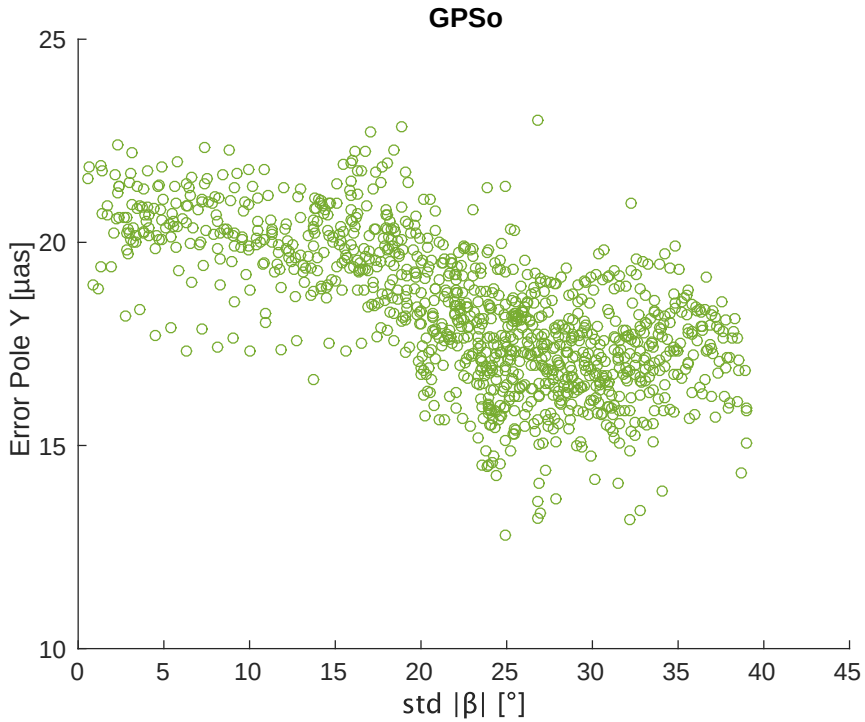

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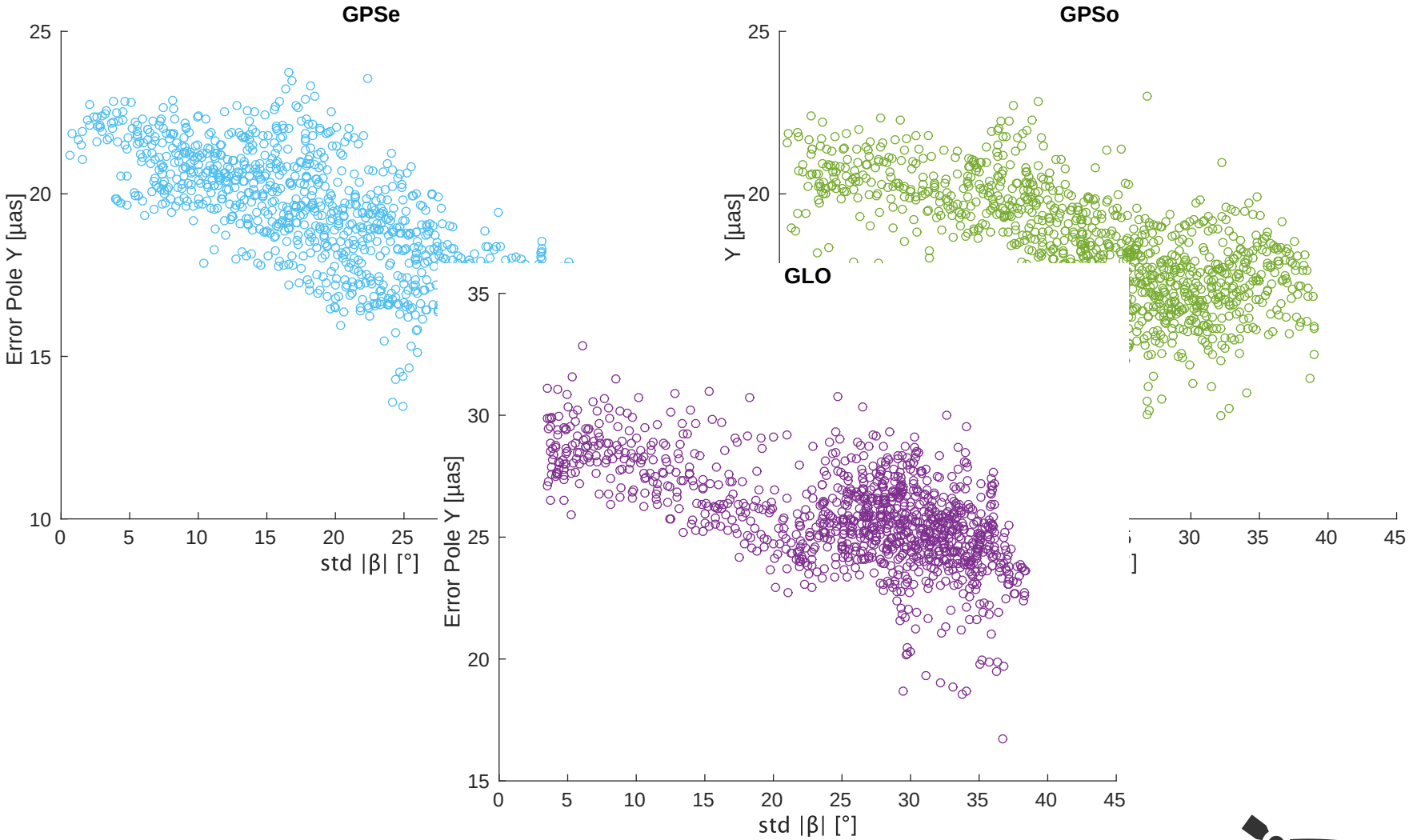

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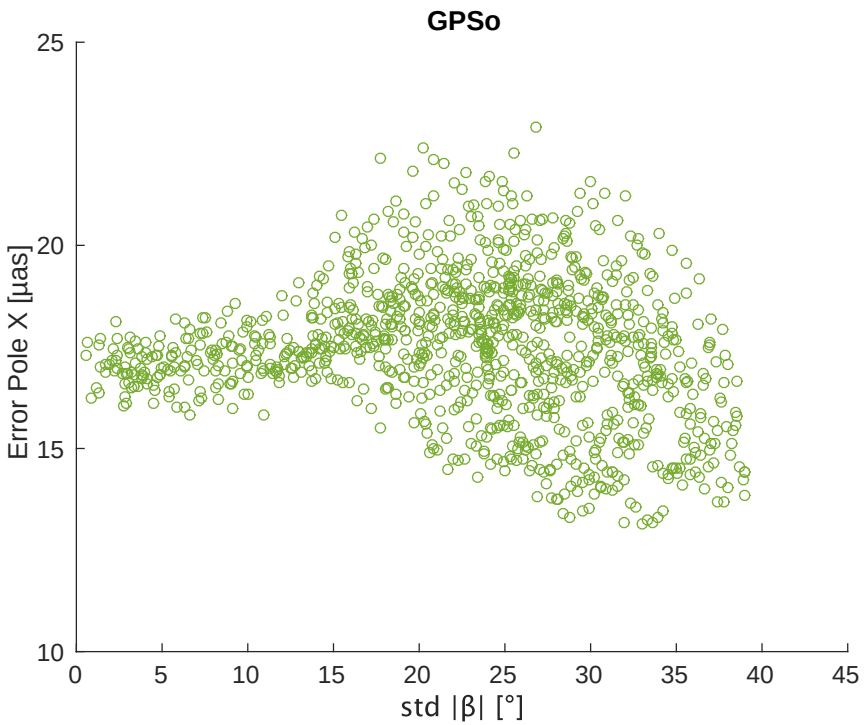

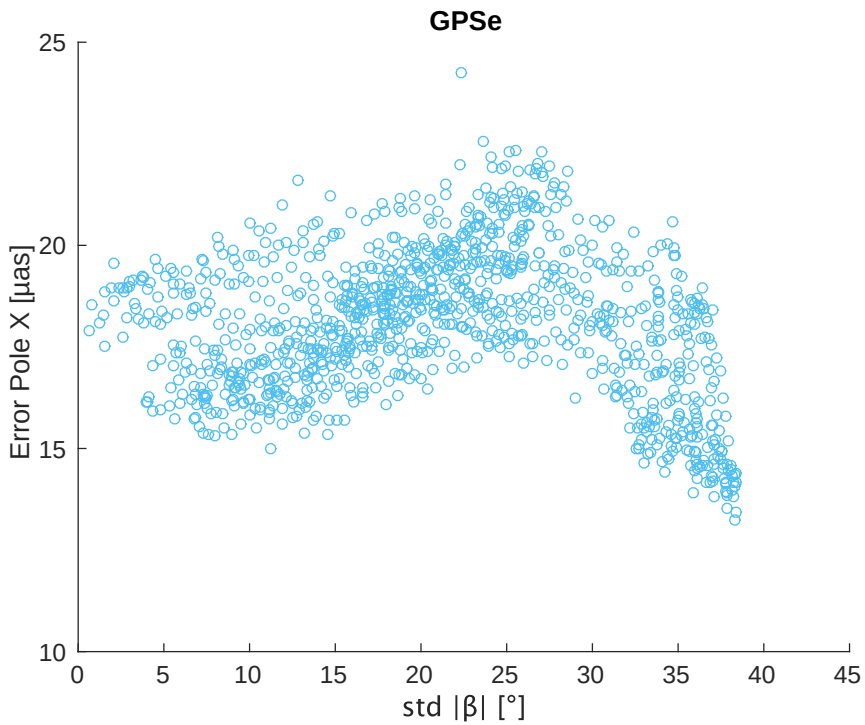

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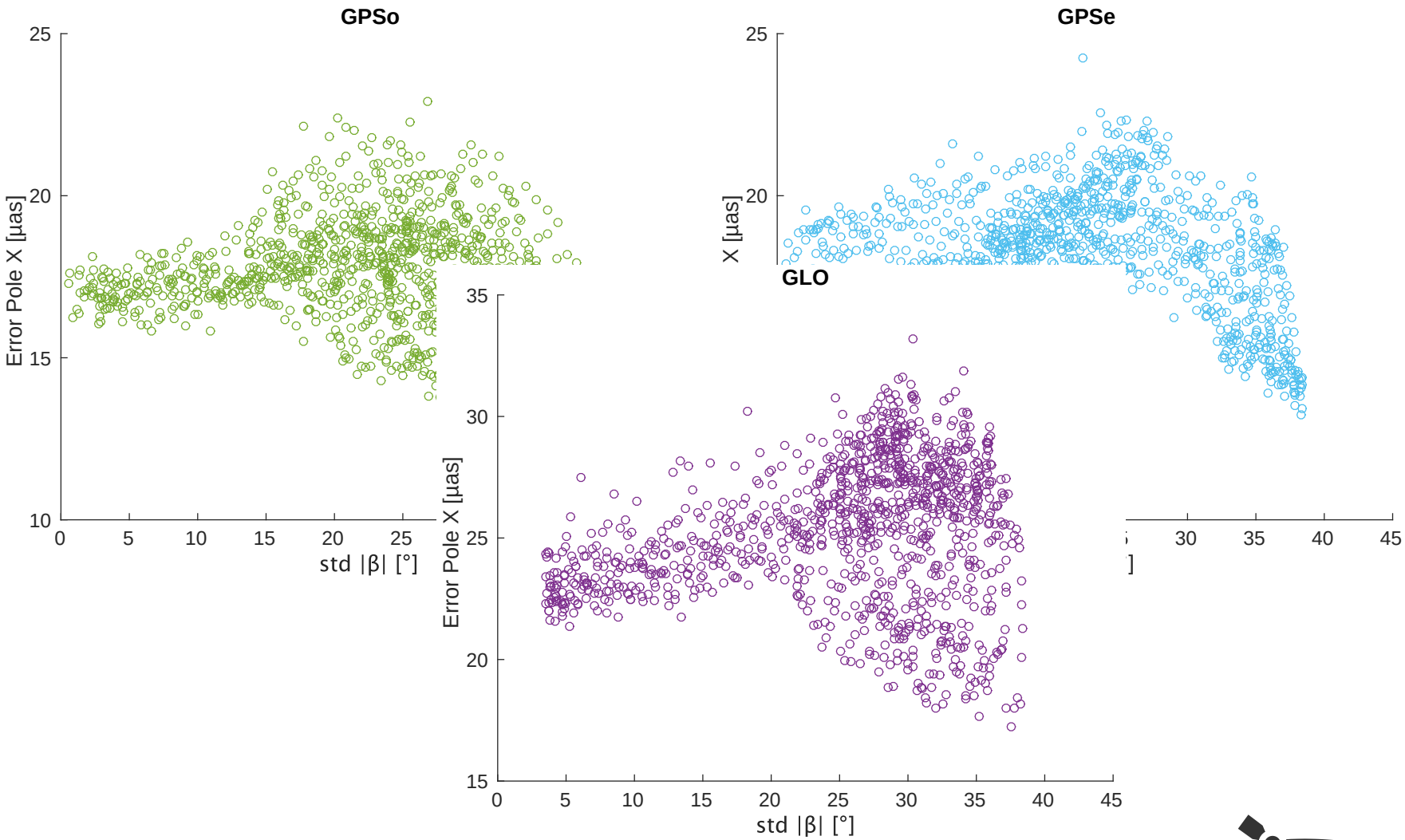

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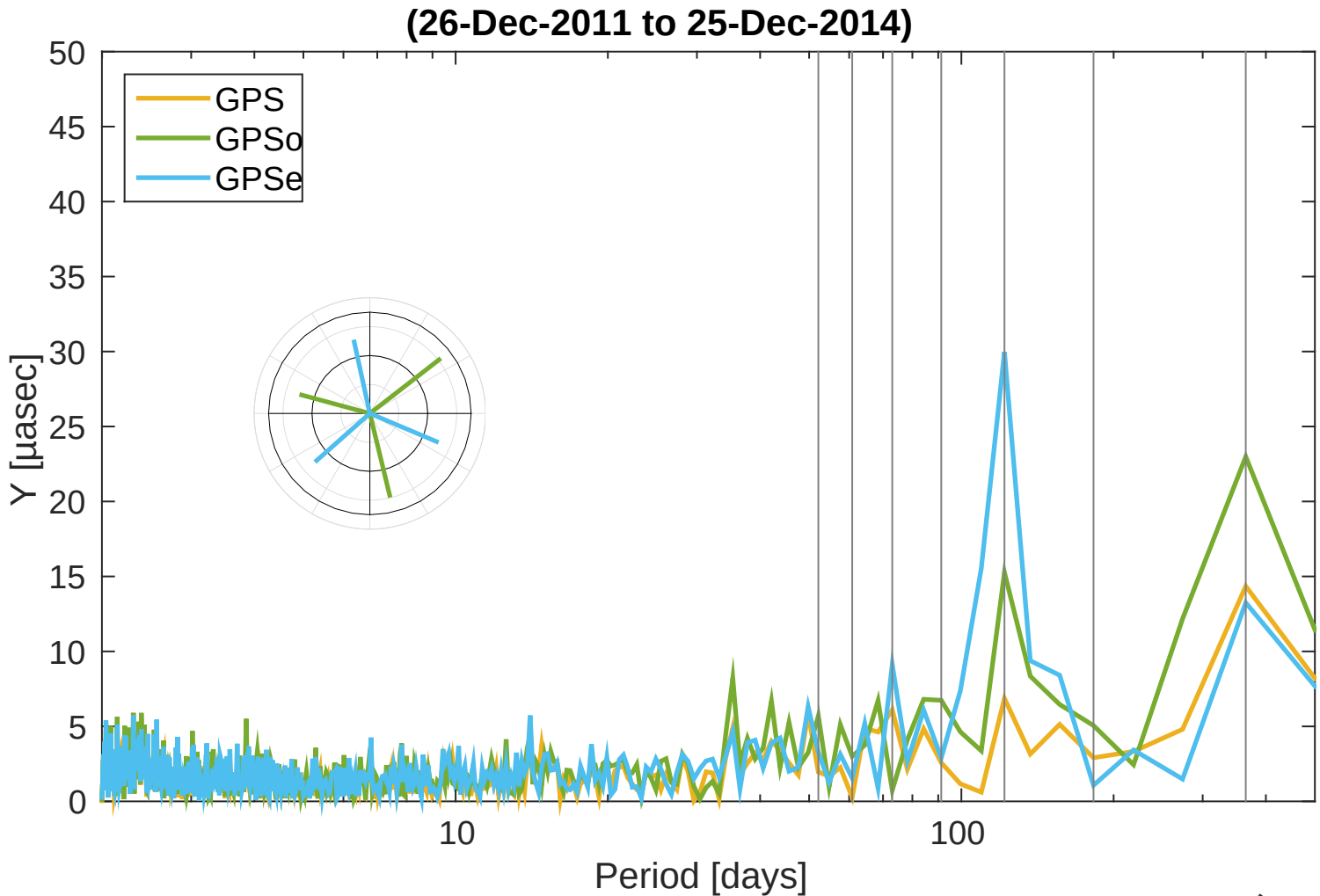

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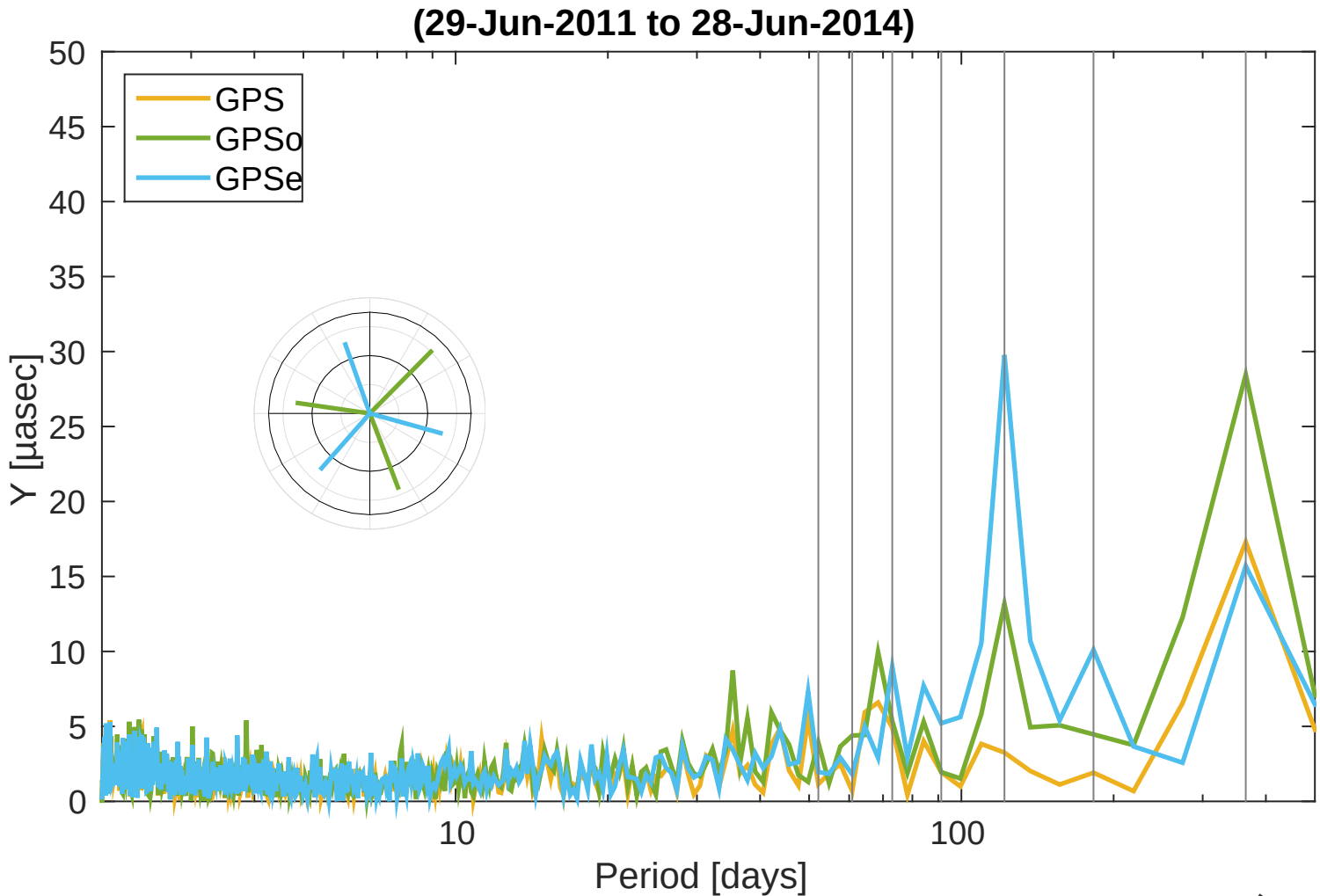

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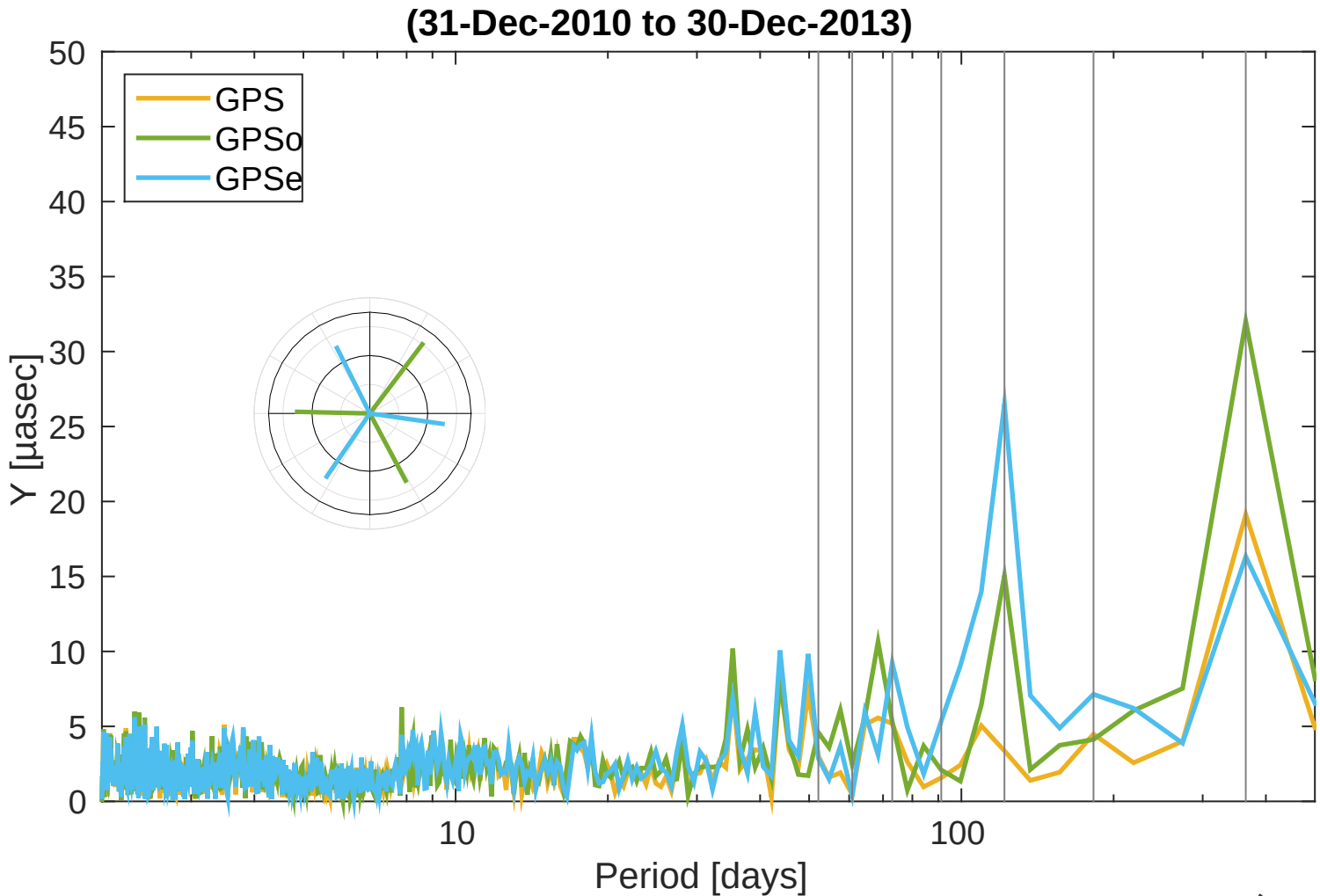

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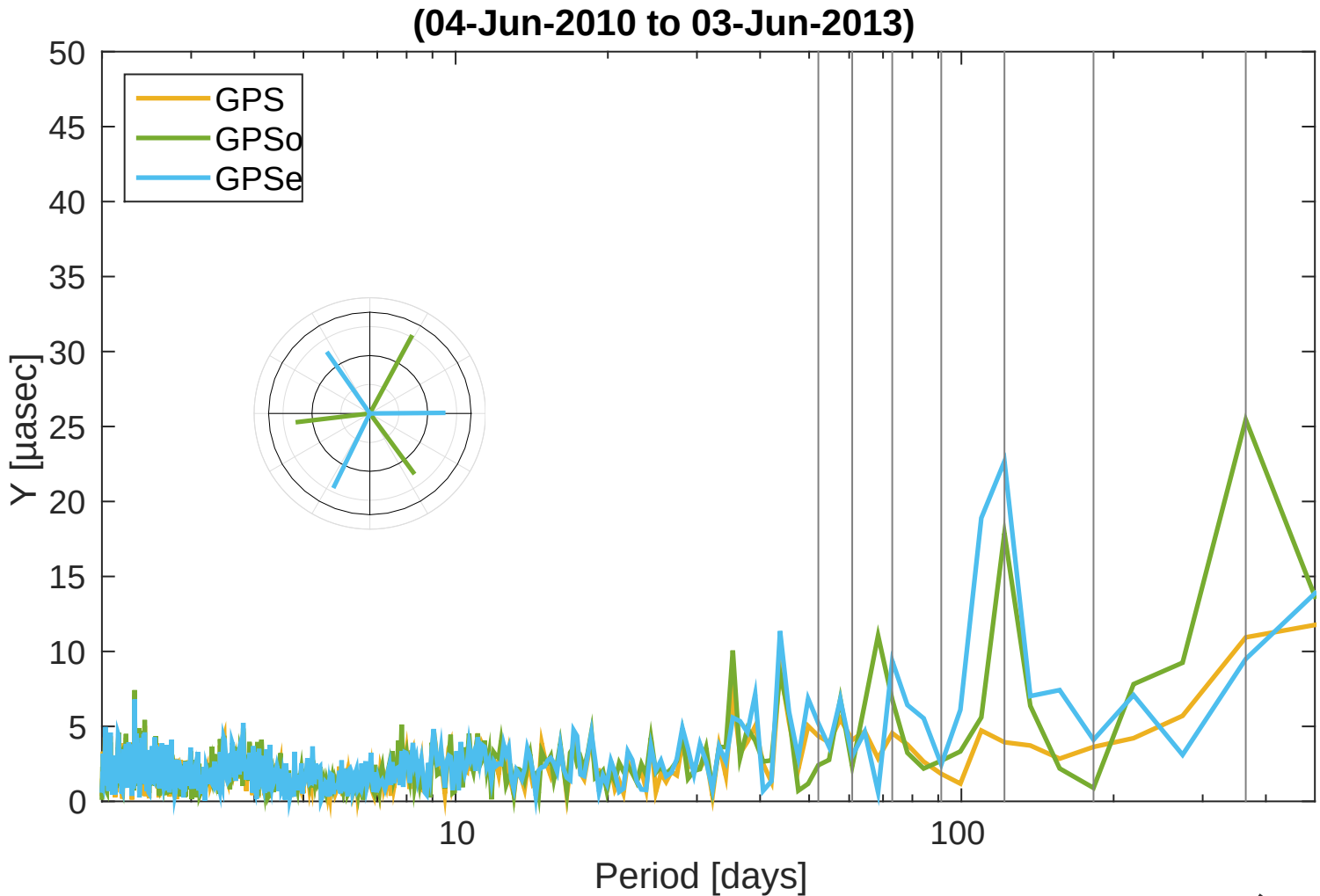

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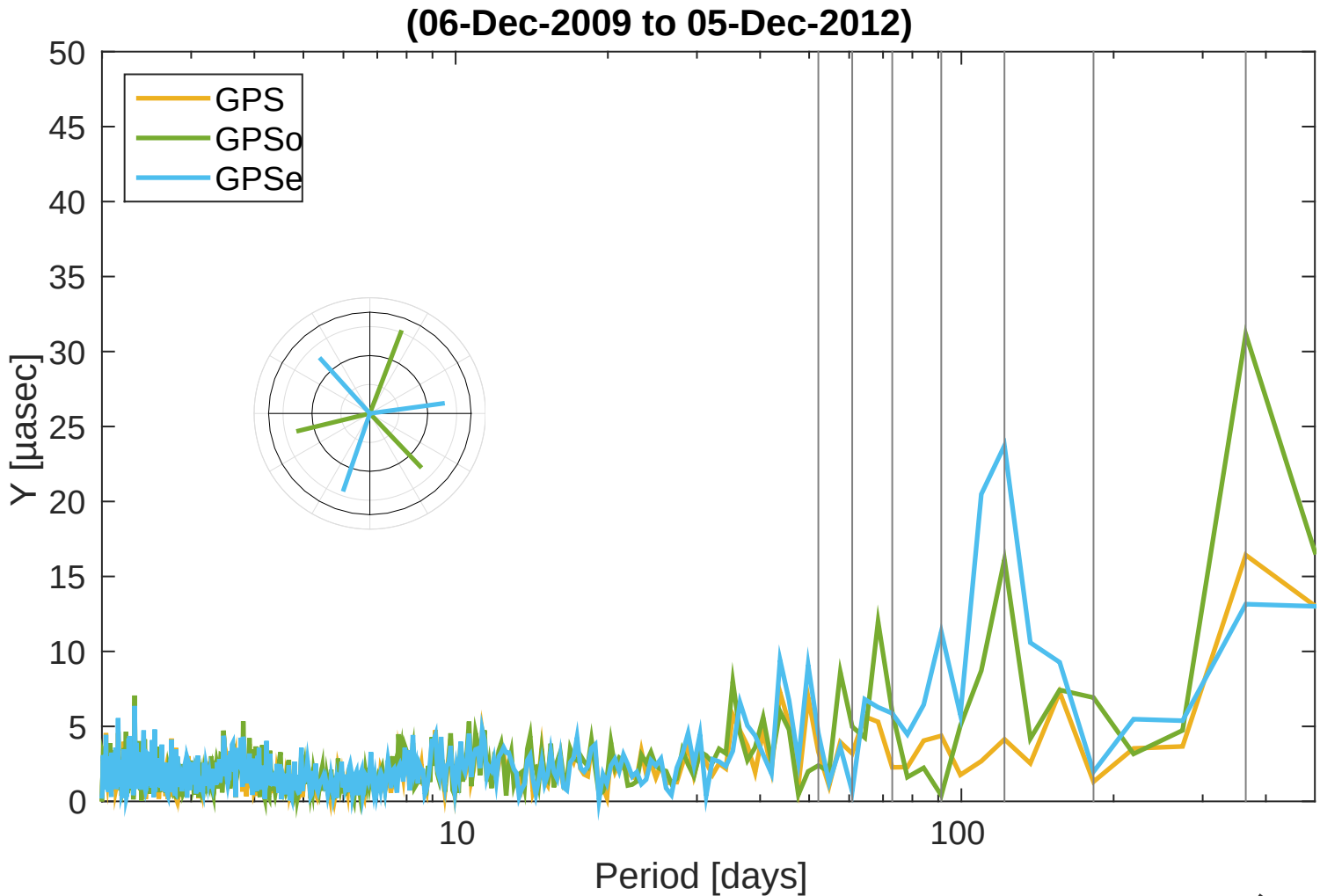

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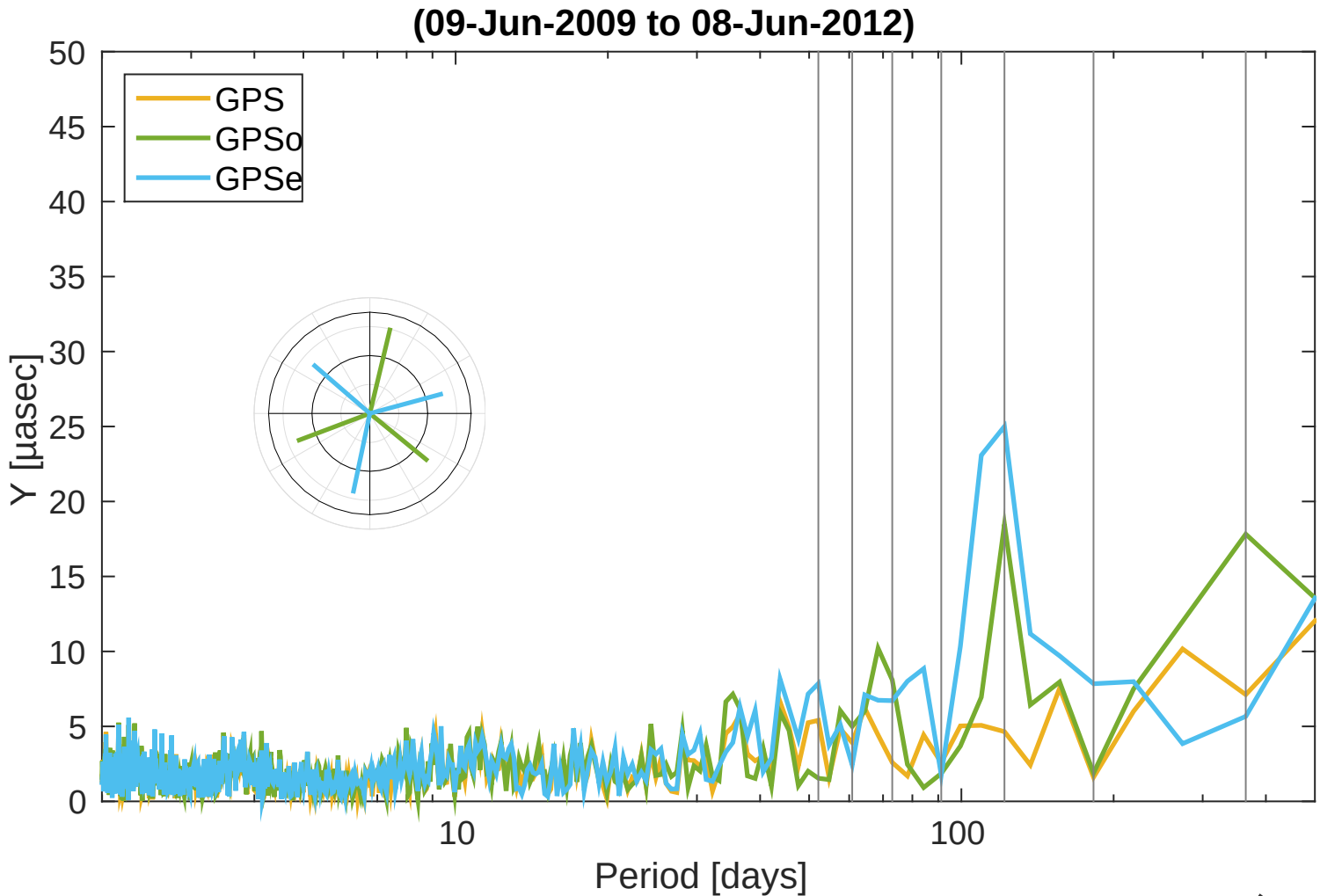

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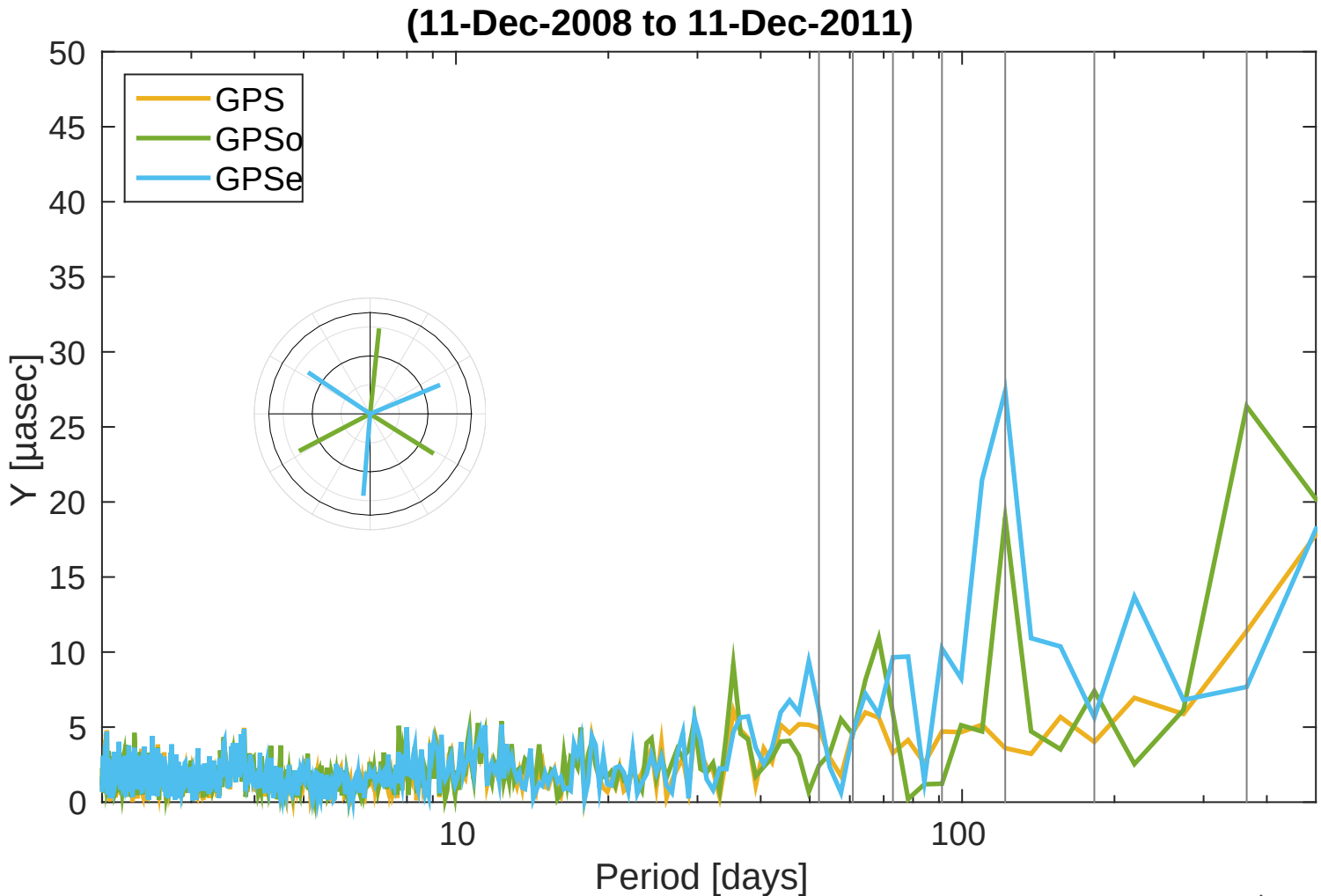

Differences w.r.t. IERS C04 series (related to ITRF2008) have been analysed.

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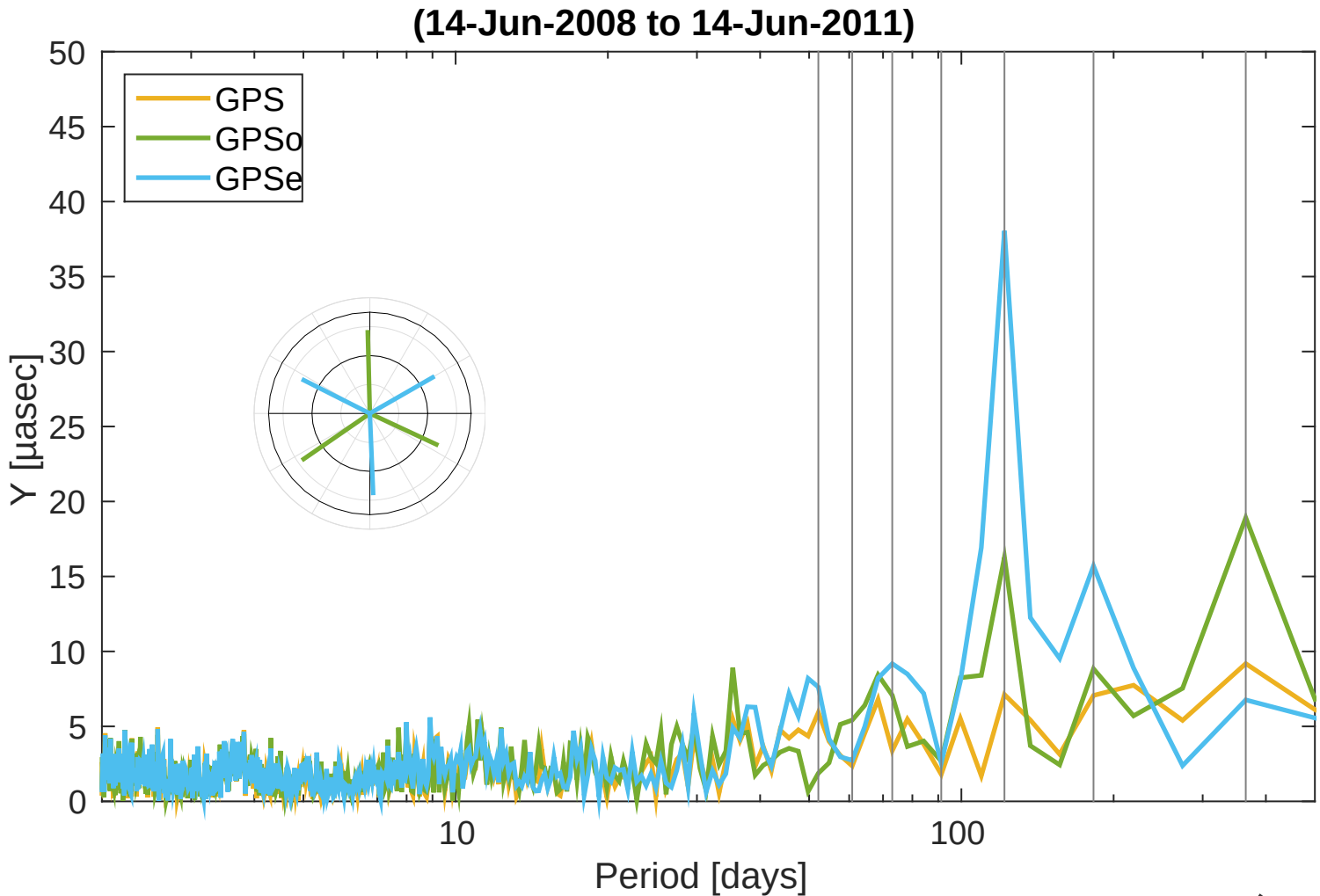

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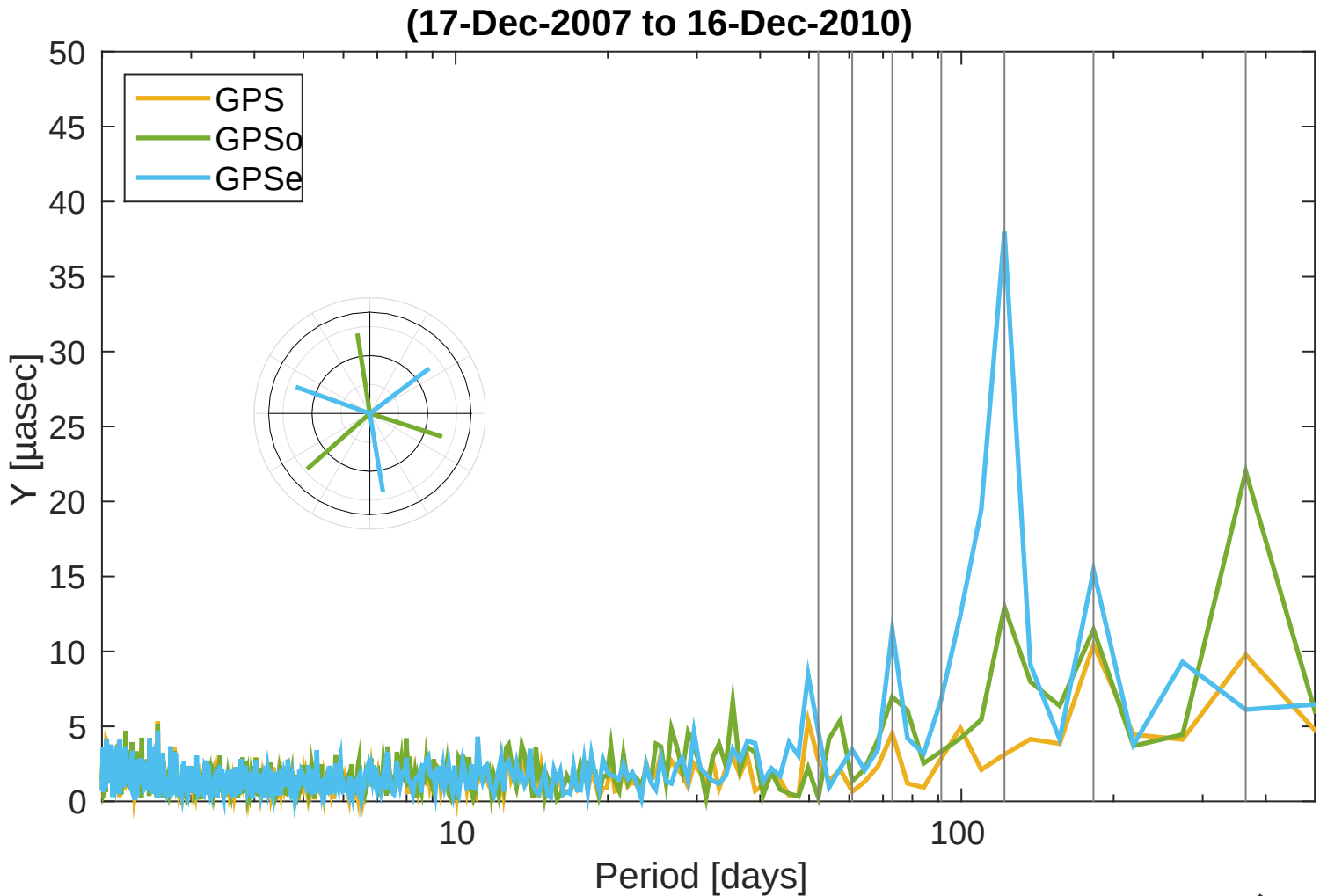

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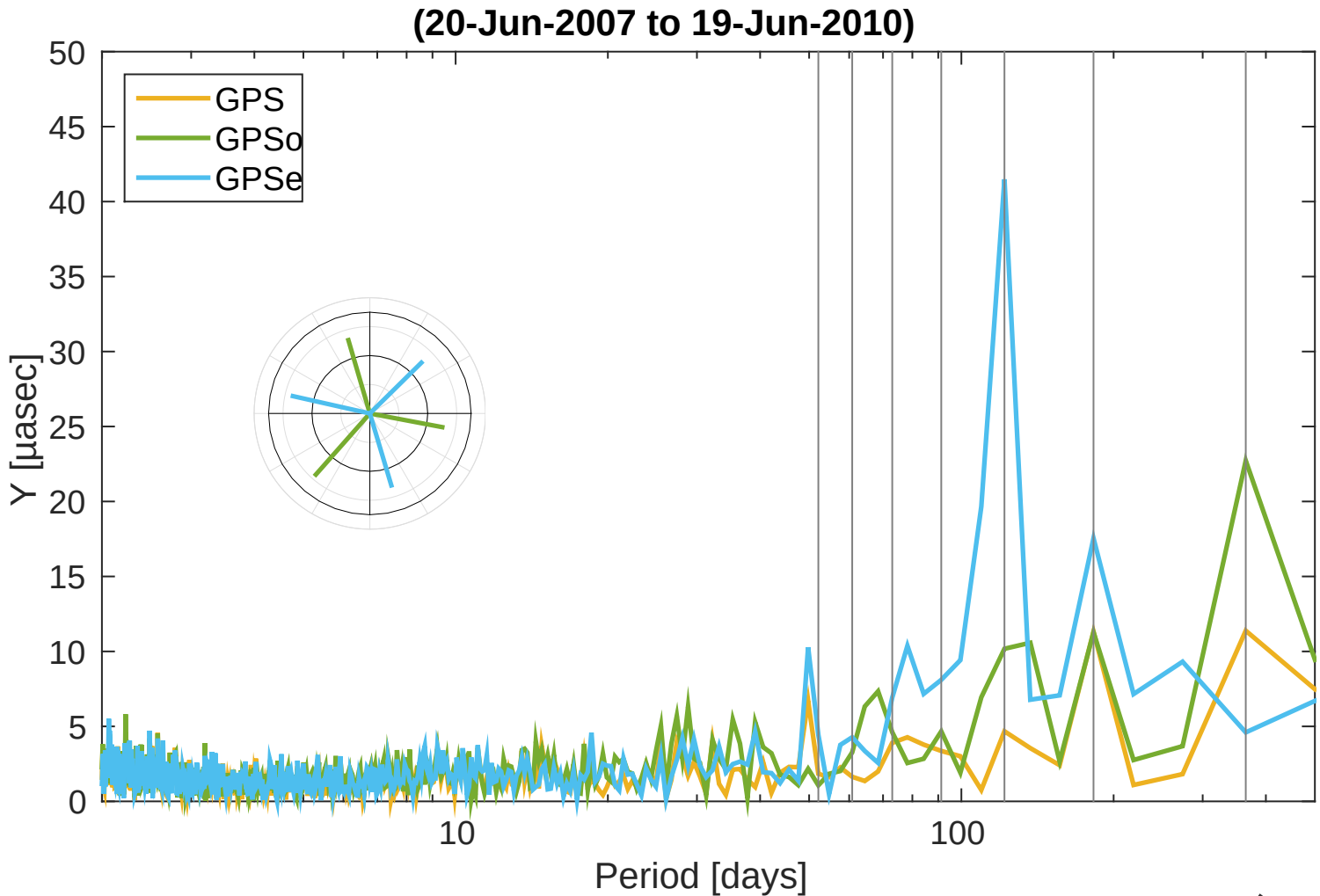

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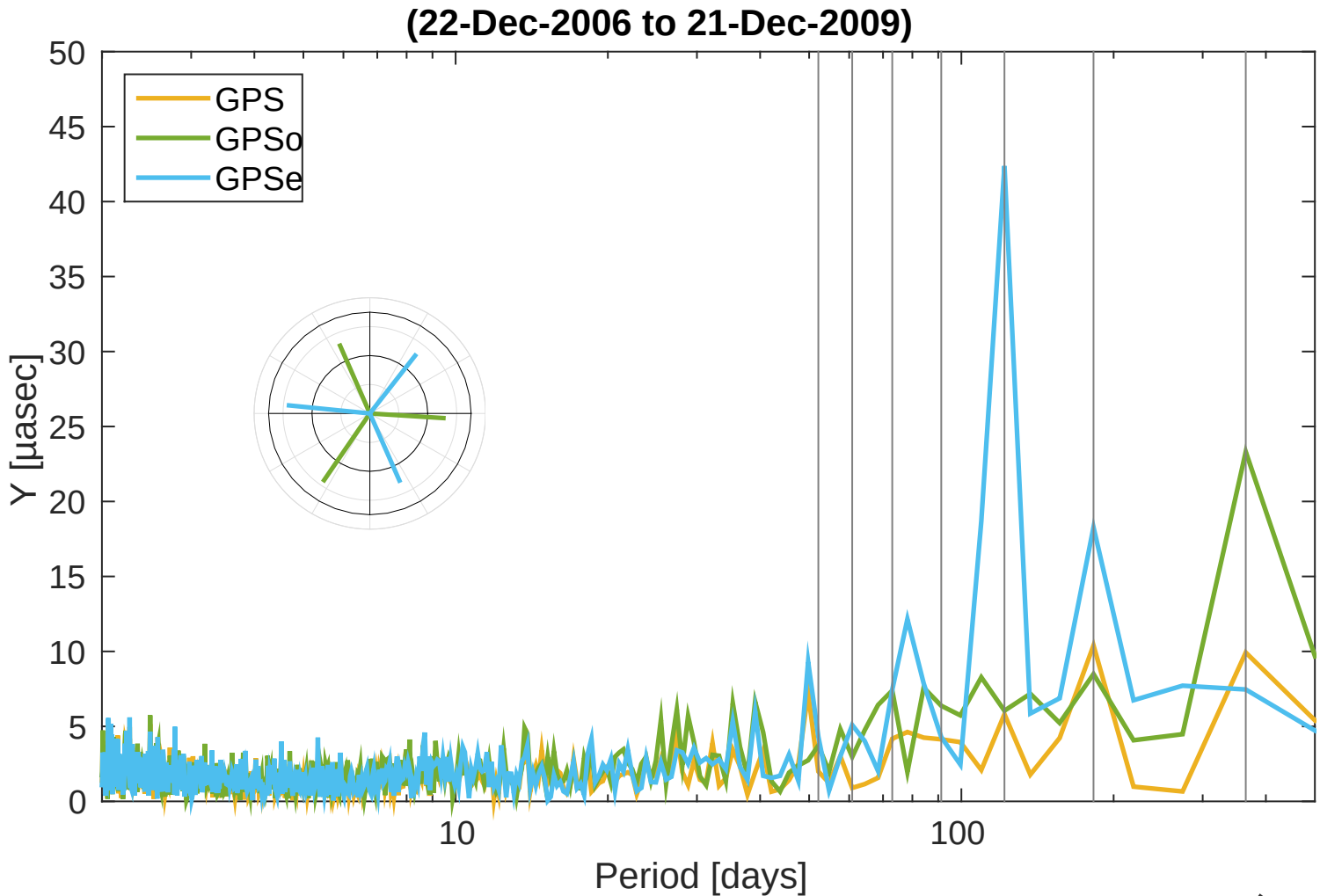

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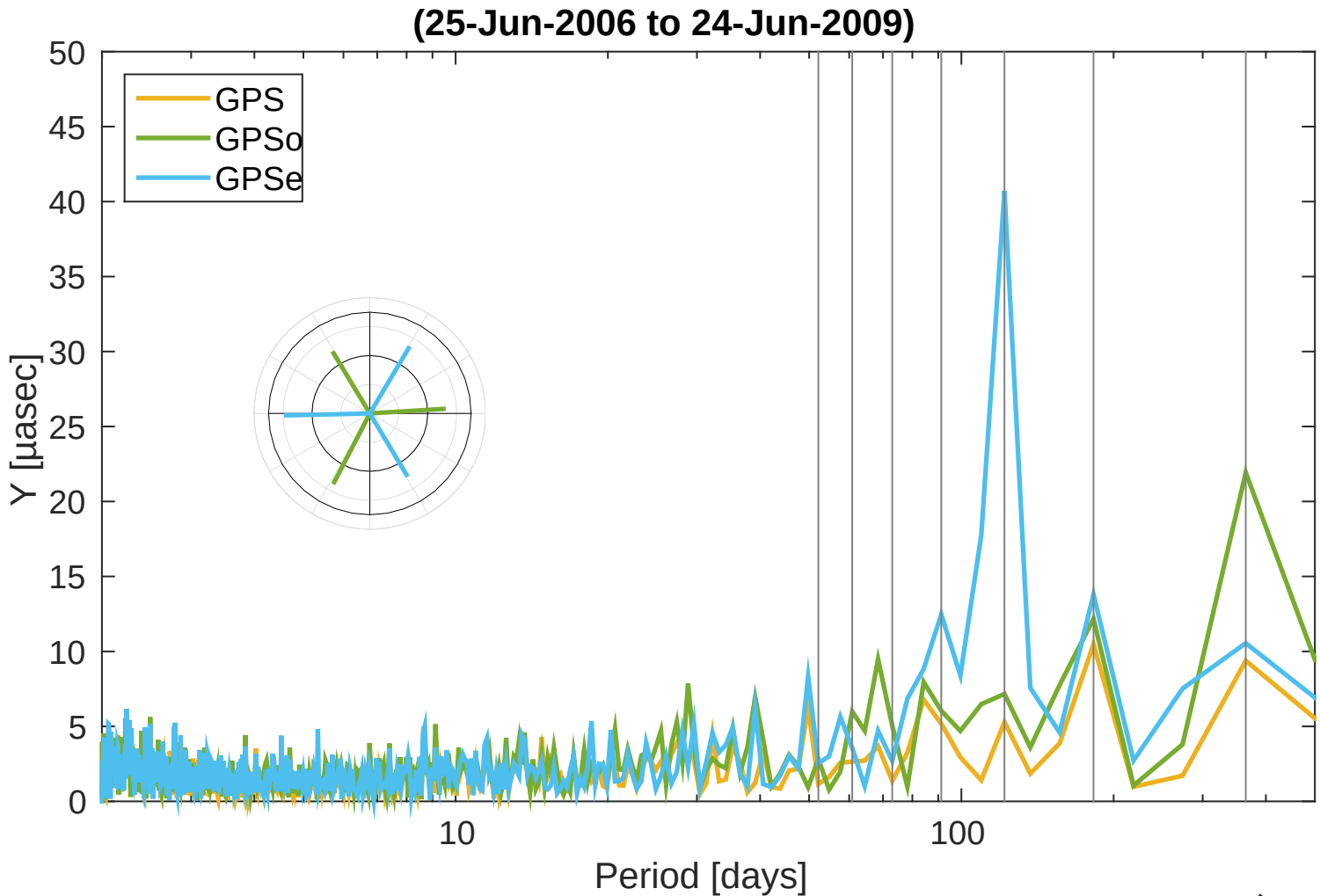

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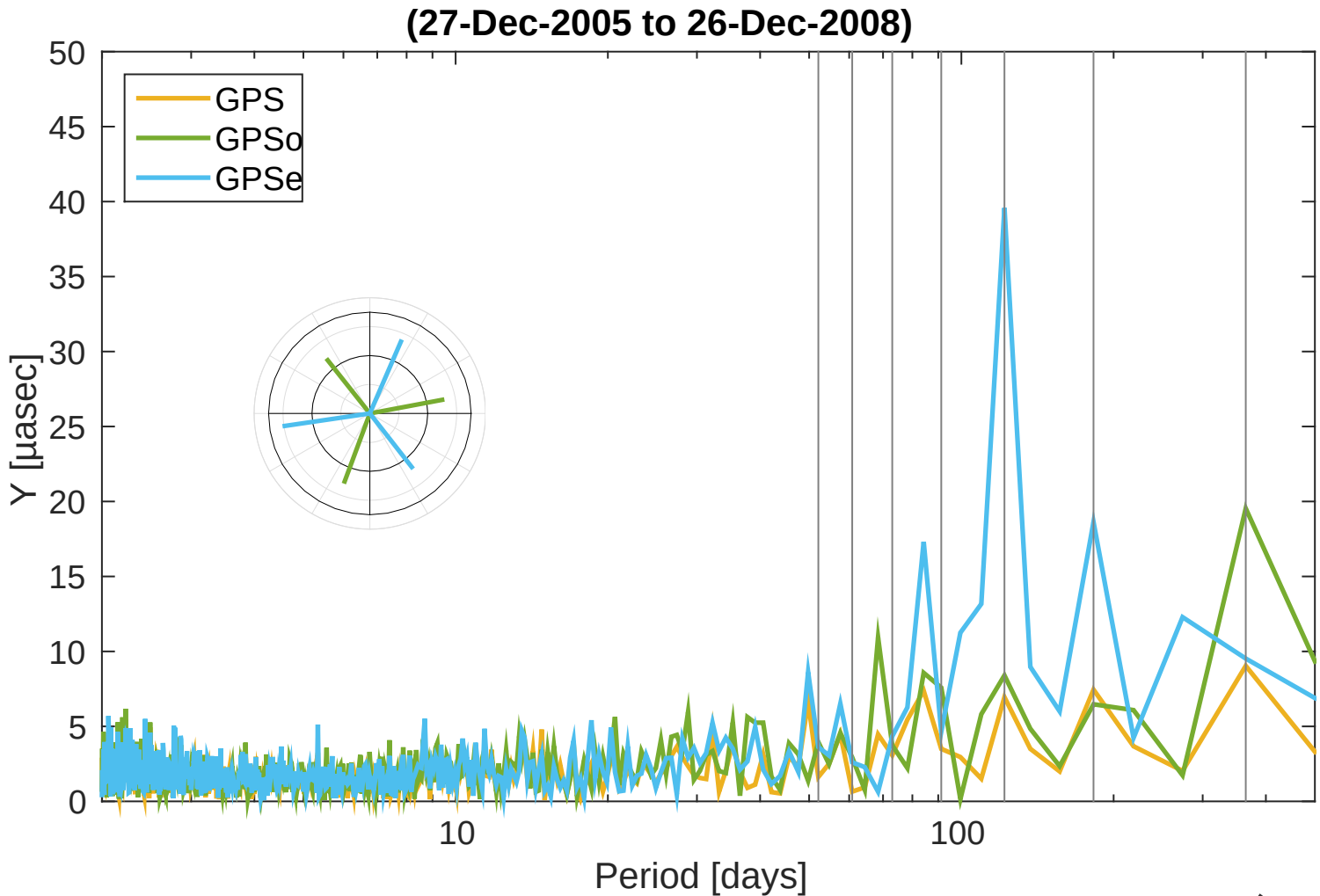

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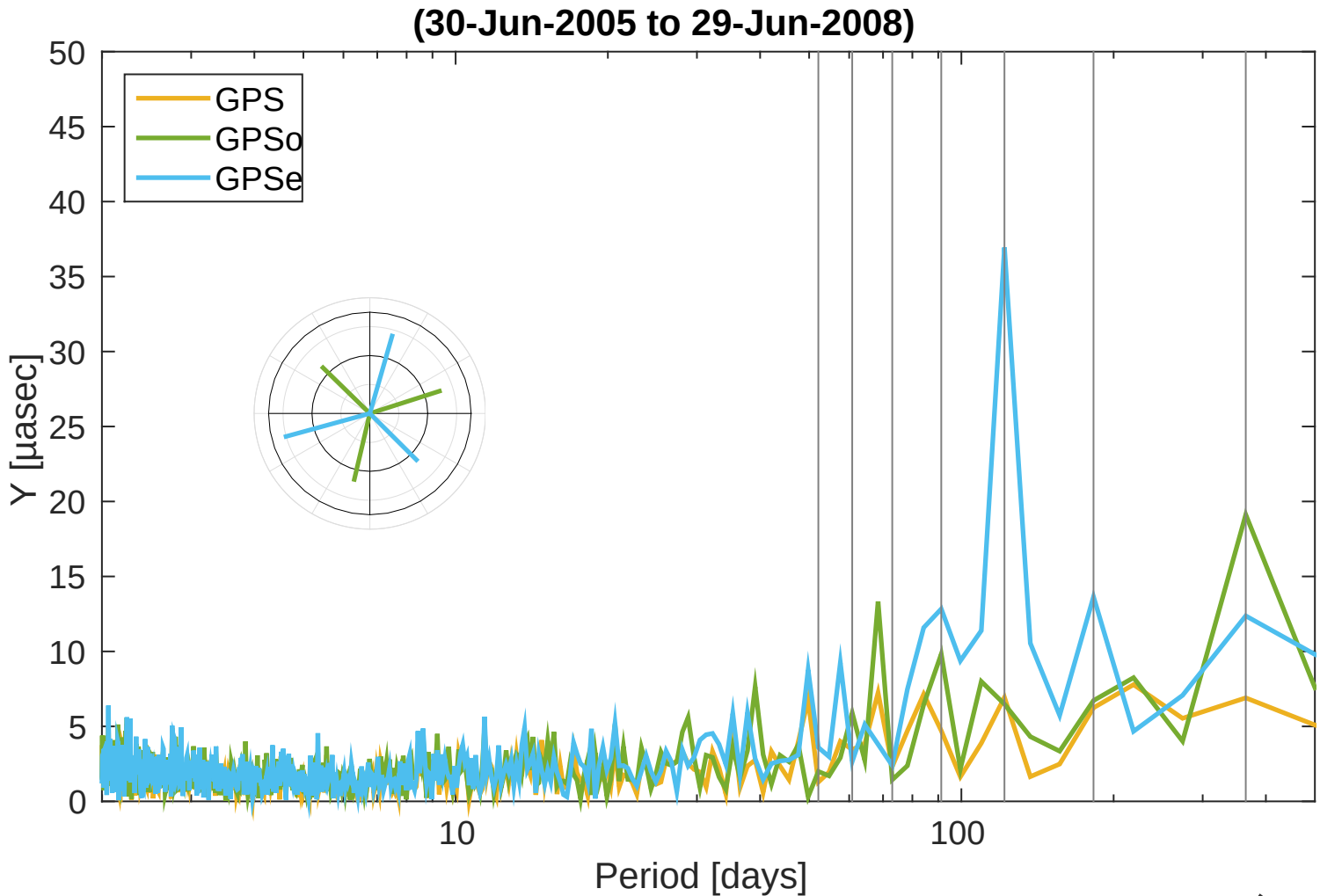

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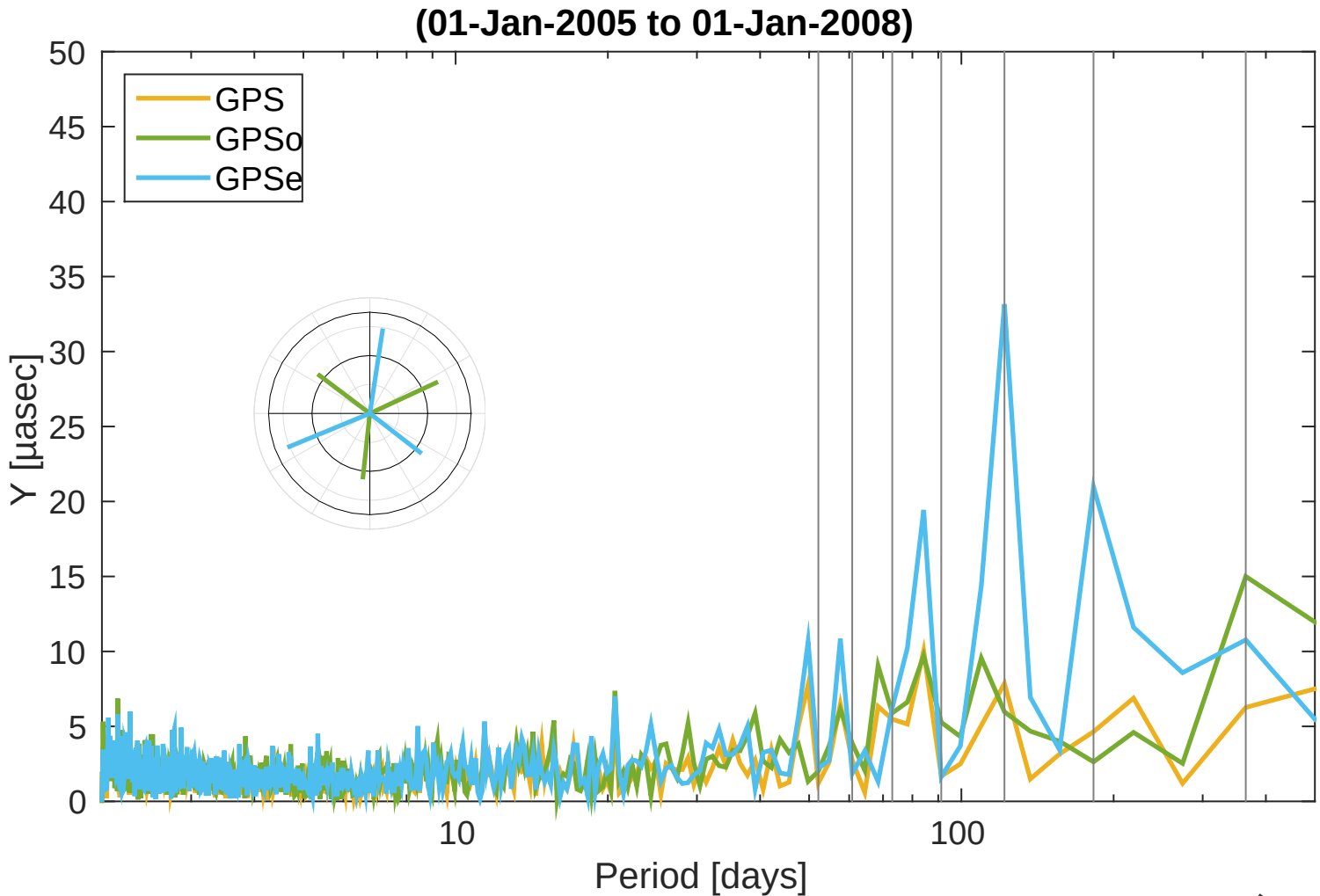

Differences w.r.t. IERS C04 series (related to ITRF2008) have been analysed.

Summary and Conclusion

- The setup of satellite-, plane-, or GNSS-specific ERP- and/or GCC-parameters was implemented.
  - It is enabled for internal purposes in the operational solution since May 2015 and the most recent reprocessing (see Poster by Sušnik et al.).
  - The results from a GNSS-specific setup on the NEQ-level are equivalent to independent GNSS-specific solutions.

Summary and Conclusion

- The setup of satellite-, plane-, or GNSS-specific ERP- and/or GCC-parameters was implemented.

- There is almost no contribution from GLONASS to a combined GPS+GLONASS GCC series (Z-component).
  - Meindl et al (2013): due to the inclination of GLONASS satellites (64°) the Sun may be almost perpendicular above the orbital plane, which results in a direct correlation with dynamic orbit parameters.

Summary and Conclusion

- The setup of satellite-, plane-, or GNSS-specific ERP- and/or GCC-parameters was implemented.
- There is almost no contribution from GLONASS to a combined GPS+GLONASS GCC series (Z-component).
- The GLONASS contribution to the ERPs is mainly limited by the three-plane constellation.
  - The ERP results from the GLONASS constellation are comparable to solutions with a synthetic three-plane GPS constellation.
  - The geometric effect changes in time due to the regression of the nodes of the satellite's orbital planes.

Summary and Conclusion

- The setup of satellite-, plane-, or GNSS-specific ERP- and/or GCC-parameters was implemented.
- There is almost no contribution from GLONASS to a combined GPS+GLONASS GCC series (Z-component).
- The GLONASS contribution to the ERPs is mainly limited by the three-plane constellation.
- Similar limitations may be expected for Galileo and the MEO-constellation of BeiDou.
- With a full multi-GNSS analysis the constellation effect should beheavily reduced, ideally eliminated.

THANK YOU
for your attention

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